SCIENTIFIC AMERICAN

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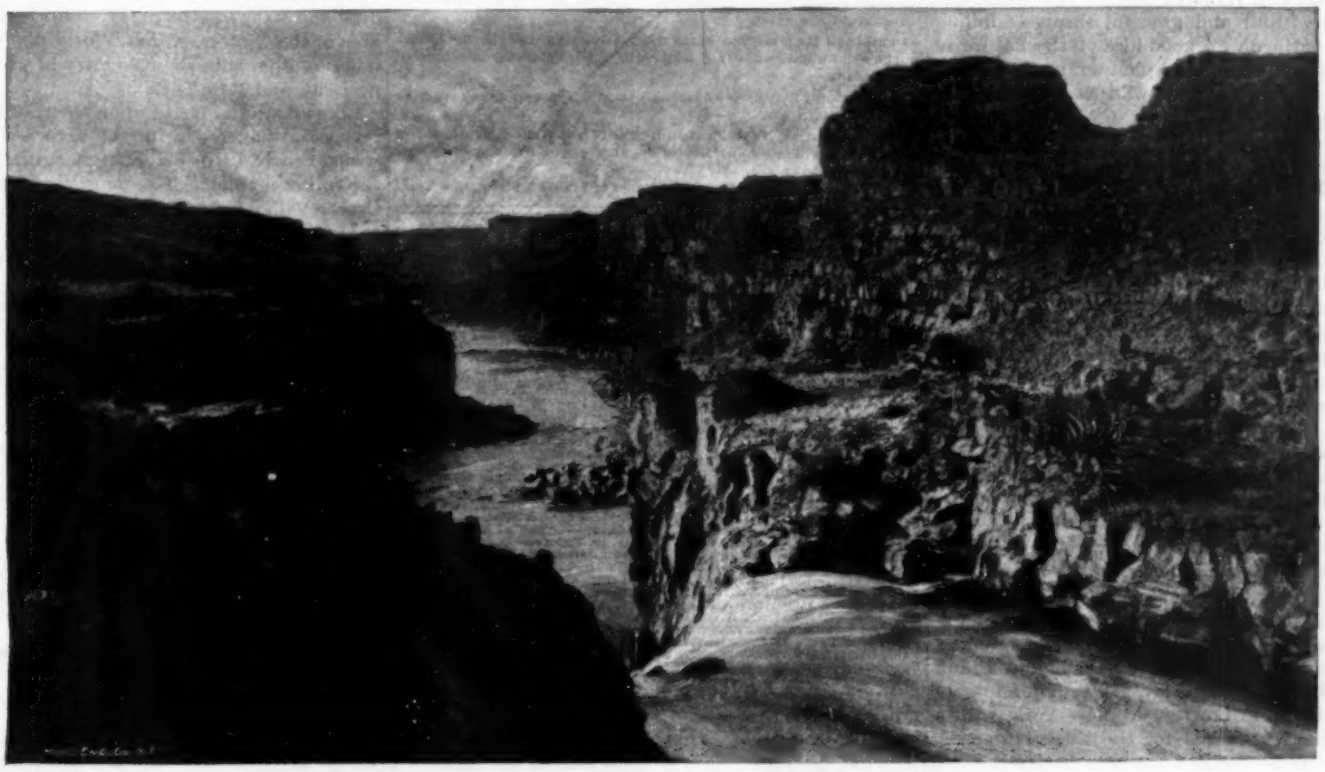
BRIDAL VEIL FALLS, SNAKE RIVER.

Although the Columbia River is the most important of the great rivers emptying into the Pacific, the Snake River, its principal tributary, is probably the most remarkable of all the Western rivers. The Columbia River, owing to the fact that it is navigable for a distance of some 115 miles from its mouth, opens up the heart of Oregon, and makes its inland towns accessible through the Pacific to all parts of the world. In the course of time serious obstructions that are found in the Columbia River at the Cascades and at the Dalles will doubtless be overcome, and it is probable that navigation will be possible throughout its course for several hundred miles. The Snake River is navigable for some 180 miles above its point of juncture with the Columbia, although this stream is noted far more for its remarkable physical characteristics than for its commercial or utilitarian advantages.

The government is at present building a canal at the Cascades which will connect the Lower Columbia with 45 miles of navigable water above that point. This



BRIDAL VEIL FALLS FROM ABOVE THE FALLS.—[From a photograph by Towne.]

BRIDAL VEIL FALLS LOOKING UP SNAKE RIVER.—[From a photograph by Towne.]

would render the river navigable as far as the town of the Dalles. This work is well under way, and will be of great importance in developing the Upper Columbia. The canal will be 3,000 feet long, with a draught of at least 8 feet.

Surveys have been made above the Dalles with a view of conducting a similar work at this point, and thus connecting, by means of locks, the Upper and Lower Columbia. The government have been clearing away rocks and obstructions in the Upper Columbia and Snake Rivers, so that now the former has a depth of 5½ feet at low water and the latter 4½ feet draught as far as Lewiston.

The Upper Snake River, however, is one of the most remarkable streams with which we are familiar. It offers an absolutely impassable barrier between Northeastern Oregon and Idaho. It has cut its way through the black basaltic formations to a depth of from 2,000 to 5,000 feet, with walls so precipitous that ascent or descent is absolutely impossible, while the stream that flows at the bottom of this frightful chasm is a roaring torrent that is and must remain always unnavigable. We present herewith views of Bridal Veil Falls, one of the most beautiful and graceful sheets of falling water on the continent. A good idea of the nature of the cañon may be had from the photographs, although at this point nature is not as wild as it is at other places along the river.

An Important Electric Lighting Suit.

On May 21, 22, and 23, at Pittsburg, Pa., before Justices Bradley and McKeenan, the final hearing in a suit brought to test the right to the modern incandescent lamp occurred. It was brought by the Westinghouse consolidation against the Edison companies as infringers of the Sawyer-Man patent. This is the patent that was granted in 1885, after some five years interference proceedings in the Patent Office between Edison and Sawyer. In the Sawyer lamp the fibrous loop-shaped conductor was used. Admitting the old lamps of the years 1841 to 1878, it was contended by the complainant that the Sawyer-Man lamp of the latter year was the first successful one. The defendants argued in opposition, claiming that Edison in 1877 gave the first successful lamp to the world. The case was notable, not only by the extent of the interests involved and the fundamental nature of the patent contended for, but also by the eminence and number of the counsel. The Westinghouse interest was represented by a number of attorneys, among them Edmund Wetmore, Amos Broadnax, J. Edgar Bull, and Frank L. Pope, of this city; while Mr. B. F. Thurston, of Providence, Mr. B. P. Lowrey, of New York, with a number of others, appeared for the Edison interests. Up to the present no decision has been rendered.

Successful Trial of the Second Otis Elevator at the Eiffel Tower.

The official trial of the second Otis elevator in the south pillar of the Eiffel tower was successfully carried out on June 8, in the presence of M. Alphand, M. Eiffel, and the Lift Committee. Four hemp ropes, holding the cage—loaded, inclusively, up to eleven tons, on the first slope—were cut simultaneously at a given signal, and the cage descended 8 inches; but the safety arrangement of compound wedges then acted, without shock, and sustained the cage. Great admiration was expressed at the result of this crucial test, and the lift was formally taken over by the committee. On the following day, Mr. Gibson, president of the American Elevator Company, conveyed the Prince and Princess of Wales and family from the first to the second floor of the tower.

The Joint Snake.

A correspondent sends us an account of a joint snake he with other school children encountered about twenty years ago, and he asks whether the existence of such a snake is denied. We reply:

The so-called joint snake, or "glass snake," is known to herpetologists as the snake-lizard (*Ophisaurus ventralis*). For description and figure, see SCIENTIFIC AMERICAN, Vol. 57, No. 10, page 152 (September 3, 1887). Its tail is very long and brittle, and a slight blow will sometimes cause it to break into many pieces. When the tail has been broken and lost, a new one immediately begins to grow, and specimens with little sprouting tails only a few inches in length have frequently been taken. These newly developed tails are lighter in color than the other portions of the lizard, and only assume the darker or normal color with age. The self-mending power attributed to the *Ophisaurus* is well known to be a shallow myth, yet notwithstanding there are some who pertinaciously believe in it.

C. FEW SEISS.

WHEN two or more colors are used, it is necessary to keep in mind the laws governing the combination of colors. All colors in combination are beautiful, provided only that the combination is artistically managed. If, however, a few light tints of red, yellow, and green are used, we are not likely to go very far wrong in the matter of combination.

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THE WATER SUPPLY FOR NEW YORK CITY.

In the course of municipal growth, New York should absorb her suburbs in the order of their coming. This is the ideal conception of urban expansion; but if by order we mean regularity of position, we find that New Jersey and Connecticut already possess more than half of the neighboring territory which rightly belongs to the metropolitan area, and that Brooklyn will credit to herself the townships of Long Island, from mere proximity.

In the narrow tract extending north along the Hudson, we must, therefore, find the districts to be acquired in succession, one beyond the other. There is some likelihood even of this section becoming still narrower and partially unfit for occupation, for, as is well known, the supply of water for the city has been gathered here for fifty years, and work is progressing within the same limits to double the volume gathered and delivered. We published in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 697, an article by R. D. A. Parrott on the influence of water storage as exhibited by the condition of the Croton basin.

A comparison is here made between the three hundred and sixty square miles comprising the drainage area of the Croton river and forty-five hundred square miles of other suburban country in New Jersey, Connecticut, and New York.

Like all studies based upon the results of the various censuses, this one is full of surprises, and brings in strong contrast the errors of imaginative opinion and the rulings of fact. The density of population in the Croton valley is first noticed to be relatively low, then to show an actual decrease—both in spite of the fact that thirty years ago the density was normal and the growth rapid.

So marked is the retardation in the whole basin, that the period of doubling in population is one hundred years longer than that of any division under consideration. Attention is also drawn to the lack of increase in the assessed valuation of property. The proof of actual retardation unaccompanied by an increase of valuation brings forward an inquiry as to the right exercised under the acts of the legislature of taking small areas for storage purposes and at the same time injuring large tracts.

The land so far condemned is insignificant in area as compared with that injuriously affected by such appropriation. To say that the working of the law is justifiable is a misinterpretation of the principle of eminent domain, while to claim that the city should buy every acre of the watershed is preposterous, since the city will soon have to go elsewhere for an adequate supply.

The deduction to be made from the tables and statements given is that the prosecution of the work has had a perceptible and measurable effect in preventing immigration and the increase of taxable property. The importance of this result as a lesson for the future can be understood when we say that the present storage capacity must be increased *threefold* before the supply of water can be *doubled*.

After showing the obvious detriment of water storage to regions which in the natural course of events should be occupied by homes, Mr. Parrott applies the data of recent census enumerations to some of the watersheds of the Catskill mountains, and points out a decrease of inhabitants here also, but from a very different cause.

The reference to the Catskills strengthens the criticism very materially, inasmuch as it makes the present expenditure of the Croton aqueduct department inexcusable on the score of necessity.

Trade Mark—Firm Name.

The English Court of Appeal has rendered a decision of interest in a case involving the right of a man to the use of his own name in business. The case was that of Turton *et al.* vs. Turton *et al.* The principal appellant had for a considerable time carried on the business of a steel roller and steel manufacturer in Sheffield under the title of "John Turton & Co." Last year he took two sons into partnership with him and changed the style of the firm to "John Turton & Sons." For many years prior to that time the appellees had been doing business as steel manufacturers under the title of "Thomas Turton & Sons," and they brought suit to restrain the appellants from trading as "John Turton & Sons," on the ground that they, the appellees, had a property in the name as a trade name. The Court of Appeal reversing a decision of Mr. Justice North declined to grant the injunction asked for, holding that the appellants had a perfect right to trade under the name they used, it being exactly descriptive of the constitution of the firm, and there being no allegation that they endeavored to deceive anybody by taking that name.

Worsteds and Woolens.

The question is asked, what is the difference between worsted cloth and woolen cloth? The answer is: Worsted goods are composed of wool that has been carded and combed, while woolen goods are made of wool that has been carded but not combed.

[SPECIAL CORRESPONDENCE OF THE SCIENTIFIC AMERICAN.]

The Paris Exhibition.

FRENCH, ENGLISH, AND AMERICAN LATHES.

PARIS, June 15, 1889.

The American lathe has, in its smaller sizes, not yet been copied in Europe, but that it will be there can be no manner of doubt when its advantages are understood here, and particularly on account of its handiness. The American lathe in the large sizes has not so much individuality about it, but it has in some of the minor details, nevertheless, as will be pointed out presently. "There is no American lathe. You are in a constant state of change, and I am informed that most of your changes are made, not to improve the lathe, but to have some particular selling point," remarked a machinist to me to-day. Now, there is just a grain of truth here, but it is a very small grain. No doubt dealers prefer to have some particular feature that they can dilate upon to make sales, but these new features are studied out by the designer, and no alteration of design is made without the conviction that it is an improvement. As to there being no American design of lathe, there are two or three distinct kinds, each of which has no counterpart in Europe, and all possessing advantages for the class of work for which they are intended. Beginning with lathes, say up to 20 inch swing, or 10 inch centers, as such a lathe would be designated in England. As a general rule, such a lathe of English design would have a hand slide rest, and not a self-acting feed. Now, be it remarked that some (only a few as far as I have yet seen) of the new designs are provided with self-acting feed motions, but most of the lathes (within 20 inch swing) you find in the workshops have, as I have said, hand slide rests and are, as a consequence, as awkward as can be for the great majority of work they are used upon. All experience shows that at least nine-tenths (and I think I would be within the mark if I said nineteen-twentieths) of the work done between the centers of such sizes of lathes is of such a short length that it can be turned from end to end without moving the slide rest from its position, while all the boring or chucked work can of course be completed without moving the slide rest; but boring and face plate work form but a small proportion of ordinary work, and it is on ordinary between-centers work that the slide rest is so awkward; first, because the slide rest handle that works the screw for the longitudinal feed will not clear the tail stock of the lathe, and you can only wind this screw half a revolution, then you must take it off, put it on again, and wind the screw another half revolution, and so on. It is positively aggravating, to one having used an American lathe, to go through this awkward and humbugging business every time a cut is set or after setting a tool. The worst thing is that on short work the slide rest smothers the work so that you can't get at it either to set the tool, see the cut, or measure the work.

With regard to the first named defect, it could be modified, to a certain extent, by putting the screw on the outside of the slide instead of in the middle of it, then throwing it further out from the line of centers of the lathe, and therefore more out of the way of the tail stock, but this is very rarely done. Now suppose that the lathe has a self-acting feed motion and a slide rest as well, as is sometimes the case in English and French practice, and you are no better off so far as the first named defect is concerned, because the hand traverse to the lathe saddle (as the lathe carriage is termed in England) consists of a long handle operating the spindle of a small pinion gearing direct into the rack of the lathe; and the consequence is that, notwithstanding the awkward length of the handle, the carriage motion is too quick (moving the handle as slowly as you can) for the purpose of feeding, and, furthermore, as the rack is cast and not cut, the hand traverse of the carriage is too spasmodic and jerky to permit of its use for feeding; but supposing the rack and pinion to be cut, which is not often the case, and the conditions are not much bettered, for the motion is still too quick and the handle is so long that the right hand has to reach out too far to admit of a close inspection of the work. Another annoying feature is the straps or clamps forming the tool-holding device, which are bulky and in the way. Again, no device for regulating the height of the tool is provided. Hence, slips of iron, pieces of tin, iron washers, and other loose and odd pieces are used for this adjustment. Whatever the length of the work may be (when a slide rest without a self-acting feed is provided), the longitudinal feed handle will come in the way of the tail block, while the length of continuous longitudinal feed is limited to the length of the upper slide of the rest. Of course the slide rest can be moved along the bed and reset, but after a little wear it will be found that each turn you move the slide rest it requires to be adjusted for parallelism again, and this involves the loss of a great deal of time. When no self-acting feed is provided, all threads must be started and cut by hand. This involves a great deal of practice in order to be able to start a true thread, and the removal of the slide rest and substitution of a hand rest when cutting the threads making the operation slow and expensive.

On the other side of the question there is the fact that with a compound rest all ordinary tapers can be turned without setting the tail stock over, that is to say, all tapers that are not longer than the longitudinal traverse of the tool slide of the rest, and tapers can be bored with every facility. But taper work forms a very small proportion of the work done in such lathes, and, furthermore, facilities for its production are provided for in all American lathes for general work. Where there are several small lathes in a shop, it is not essential nor even desirable that all of them be provided with facilities for taper boring, as it involves the use of either a compound rut or a taper-turning attachment (the latter being the most desirable of the two).

Considering now the American form of similar sized lathes, a self-acting or automatic feed is always provided, and the tail stock is made to set over for turning tapers between the centers. As a result a continuous cut either taper or parallel, can be taken on work as long as the lathe will take in. If taper boring is to be provided for, a taper-turning attachment is provided for, or in some cases a compound rest is used, but this compound rest is not open to the objections shown to exist in corresponding English lathes, as the hand traverse of the carriage is slow enough to permit of hand feeding by means of the handle that works the hand feed of the carriage. This is accomplished by means of gearing in the carriage that reduces the revolutions of the rack pinion below those of the hand feed handle. This speed reduction is sufficient that a short hand feed handle can be used; and the position of the operator's body is therefore natural and not strained when using this hand feed. Hence, he can operate the cross-feed screw and watch the cut or measure work with ease and comfort—a thing impossible in English or French lathes. By thus dispensing with the longitudinal slide of the compound rest, the work is in full view (no matter how short it is) and is accessible for tool setting or measuring. The American plan also of a tool post in a T slot leaves nothing but a simple cylindrical tool post in front of the work, and this tool post can be moved to either end of the T slot as may be most convenient for the kind of work in hand, hence the tool may be clamped as close to the work as possible and swiveled to any angle to the line of centers, which is a great convenience, not attainable where two clamps are used or a single tool post in the center of a square slide. If the lathe has a taper-turning attachment, you can change from taper to parallel work in a moment without unsetting the lathe, whereas in the case of a compound rest and no automatic feed a great loss of time occurs in making these changes, because of the difficulty of setting the top slide to cut parallel, and a great deal of skill is required. So much indeed are these two difficulties met with that, to avoid them, the workman is often induced to adopt improper methods in doing his work. Thus, to take a common example, suppose a crank pin (for an engine) with a taper on it is being turned, and the taper part will be finished complete before the parallel part is roughed out, with the result that the two parts will not be true, one with the other.

Let us now consider very short work of small diameter, and with the American form of lathe carriage and rest the tool need not stand far out from the tool post or rest, as there is nothing to interfere; whereas on the English or French lathe the top slide comes butt against the tail stock, and the tool must be pushed out far enough to meet the work. The tool posts of all American lathes of the sizes under consideration are provided with more ready means of adjusting the tool height without using the slips of iron, etc., before referred to.

Objection has been made to me concerning the desirability of constructing the tail stock to set over for taper turning, as it is said to involve some trouble and difficulty in setting it back true for parallel turning, but this is an unnecessary trouble, since it is not necessary to operate both set and tail stock screws. Indeed, only that screw should be unscrewed that will let the tail stock set over in the required direction, the other screw being allowed to remain untouched, and therefore set for parallel turning, the tail stock being pulled over by hand. All that will be necessary in that case for putting the tail stock back true for parallel turning will be to screw up again the one screw that has been turned back. Workmen often overlook this wrinkle, and give themselves a great deal of unnecessary trouble and loss of time.

We may now consider the chucks and fixtures for this class of lathe, and, beginning with the smallest sizes, there is a large sale here of both two, three, and four jawed American drill chucks, and as yet I have not seen any English or French imitations of them. In work-holding chucks, whether universal or combination chucks, the same remark applies, but, strange to say, the chucks are very little used, face plates with dogs removable from hole to hole being used, and bell chucks also. A dog chuck or a bell chuck for lathes of the sizes under consideration would be curiosities in American workshops. The movable dog chuck belongs to a primeval era that has long passed away in the United States, nor is there any occasional use for it. The bell chuck, however, can sometimes be used to advantage even where the most improved chucks are used, because it will grip firm enough with its double set of screws to permit work to be operated on a long way out from the chuck without the use of a steady rest. The cone plate for use in place of the steady rest is also a good English form of chuck for very true work, but, like the bell chuck, it can be done without, and the occasions for its use are so rare that it is not a good investment to either make or buy one, unless for special work done in quantities. There are no elevating rest or weight lathes used in England or France. Nor have I yet seen a small lathe with raised vees, all having flat shears, with vee slides on the edges like the old style Sellers lathe or the Freeland lathe.

I am well aware that even in the United States there are some who decry the raised vee, and also at the elevating rest and at the New England lathe as a whole, but that is because they apply it out of its place. "How can you do good boring on such a lathe?" I have been asked. My answer to this is that at the Ashcroft Manufacturing Company's works, in Boston, I saw chucked work that stood 18 inches out from the face plate on a 24 inch swing lathe faced and bored as smooth and true as could be, as pretty a piece of work as a mechanic could put his eye on, and the lathe was one of Sam Putnam's design. Now take a Pratt & Whitney elevating rest lathe, with taper-turning attachment and stop motion, and it is all that can be desired; in fact, both these lathes are simply perfection, and their peers do not exist on this side of the ocean. I could name many more American lathes that are pre-eminent in their lines; and it must always be remembered that the shop system has got to be considered when the lathe is considered. A light lathe will do when the cuts are light and the feeds fine, but if you are going to spare blacksmithing and use the lathe to cut the work out of the solid, of course the lathe must be heavy and all its parts strong.

JOSHUA ROSE.

Burning of Seattle.

About three o'clock in the afternoon of Thursday, June 6, fire broke out among some turpentine in a frame building at Front and Madison Streets, Seattle, W. T., and, fanned by a high wind, rapidly spread. The fire jumped the street, and within a half hour had consumed another block of buildings. The opera house block, a fine brick structure, was the next one to go, and then, one after another, square after square of business structures of wood and brick succumbed, and the fire became a great conflagration, spreading with almost inconceivable rapidity.

The burned district covers an area of about thirty-one blocks, its boundary being University, Front, Spring to Second, James, South, Fourth, Wall, and Water Streets, comprising the business portion of the city, the residence district escaping. Every newspaper, hotel, telegraph office, railroad depot, and wharf in the city was destroyed. The entire water front, including all wharves and docks, coal bunkers, and railway tracks, the wholesale quarter, and everything south of Union Street and west of Second Street, and reaching around to the gas works and above Fourth Street, on Jackson, was completely burned. No less than 280 firms and persons doing business have suffered loss.

The population of Seattle is estimated at 25,000, and the loss by this fire is roughly estimated at about $7,000,000. Of this something over $2,000,000 is covered by insurance.

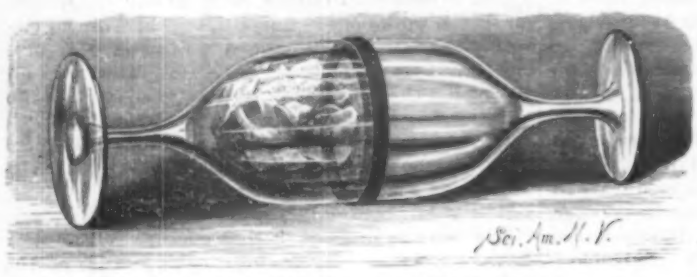
Corporations Retard Inventions.

Mr. Erastus Wiman, on the subject of telegraphs and telephones, in an address before the New York Electric Club, recently said, among other things, that it was a great blessing that the telegraph and telephone were early divorced, "because I do not believe that the telephone would ever have been developed to one-quarter the extent to which it has been developed if it had been dependent on the telegraph." To which *The Electric World* adds, "and those are exactly our sentiments." Mr. Wiman goes on to show a little later how the Western Union Company discourages invention. "To-day the Lord help the man who goes to the Western Union with a new scheme," says Mr. Wiman. What electricity stands in need of to-day is not the repressive spirit that sits down at once on the man with the new idea, but the encouraging spirit that tenders a helpful hand to every inventor of genius and high aspiration. We shall never have too many inventions in electricity, the *World* adds, but under the regime of Mr. Wiman's trust there would soon be too few. Our patent record, week by week, shows how active is invention in the electrical fields. What would be the stimulus or encouragement to all these persevering inventors, producing new apparatus and appliances for the good of mankind as well as for their own benefit, if they were at the mercy of "a hard-headed set of men on new schemes" bent on "discouraging speculation or inventive enterprises" by all means in their power?

EXPERIMENTS ON THE INEXPANSIBILITY OF WATER AND CONTRACTION OF ICE.

T. O'CONOR SLOANE, PH.D.

When ice melts, the water produced is of considerably less volume than was the original ice. This is obvious from the fact that ice floats upon water. The reverse is a fact but too well known to housekeepers, who trace many broken vessels and fractured water pipes to the expansion of freezing water. The change in volume is a sudden one for the most part. At 39·2° F. water attains its greatest density. If the temperature is lowered it expands slightly, until 32° F. is reached, when it freezes, if there are no causes to prevent. In freezing it suddenly expands about one-eleventh of its bulk with almost irresistible power. A pressure as high as 28,000 pounds to the square inch has been estimated as having been exerted by it.

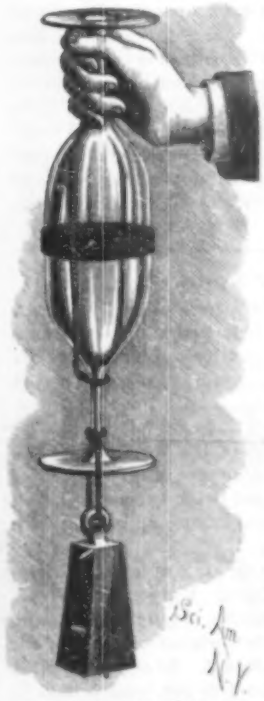


THE CONTRACTION OF MELTING ICE.

Many other substances in solidifying experience the same change. Thus solid cast iron floats on melted iron as ice does on water, and for the same reason.

This sudden expansion is the more impressive in the case of water, because it is ordinarily of comparatively constant volume. Its change of bulk by alterations of temperature or pressure is but slight. It resists compressive or expansive strains, yielding but little to very high pressures.

Both of these phenomena—the reduction in volume experienced by melting ice and the slight expansibility of water—are illustrated by the simple experiments shown in the cuts. Nothing in the way of apparatus is required to perform them, unless a couple of wineglasses or goblets and an India rubber band can be termed such.



THE INEXPANSIBILITY OF WATER.

The simplest one may be first described, the illustration of the slight expansibility of water. If two empty wineglasses are placed mouth to mouth, and a rather wide India rubber band is sprung around the junction, they will resist separation with some force. The glasses in separating slide, like the members of a telescope, through the band, and in doing so cause the air within to be slightly rarefied. A partial vacuum is produced, and some exertion is required to separate them. When they part, a slight report is produced by the inrush of the outer air. It is evident that if the glasses were filled with a non-expansible substance, they would adhere much more strongly. For air, therefore, water may be substituted.

The glasses are immersed in a vessel of water large enough to hold them mouth to month. The band is sprung over them and is worked up as near the lip of one of them as possible. It is important that it should be wet, to facilitate its sliding. The glasses, immersed so as to be filled with water, are next brought mouth to mouth beneath the surface. The band is adjusted by sliding so as to cover the junction as evenly as possible. Care must be taken to exclude all bubbles of air. The glasses are then removed from the water, when they will be found to adhere loosely yet strongly. They can be worked from side to side, but will resist a direct pull with great force. A very heavy weight can be sustained before they come apart. The water contained within them is practically inexpansible, and permits no telescoping of the band and glasses.

The second experiment may now be tried. The glasses are separated and emptied, and the band is sprung around one of the glasses and is brought down below the edge, so that only half of its width surrounds the body. The other half will now spring inward and form a horizontal diaphragm through which a large aperture extends. It represents a flat perforated washer. The glasses are again immersed in water and filled. A lump of ice as free from air bubbles as possible is introduced into one of them, and they are as before brought together under the surface of the water. The ice is, of course, rapidly melting. The instant they touch, they adhere strongly. The shrinkage of the water as it changes from the solid into the liquid state produces a vacuum, and the atmospheric pressure forces the glasses strongly together. They are now removed from the vessel. It will be found that they can be laid on their sides and rolled about; that they can be held by the base of one in a horizontal position, and that they will sustain a very heavy weight before pulling apart. They will adhere thus for a number of days, until gradually enough air has leaked in to destroy the vacuum. The other arrangement of band could be used, and is to be advised when the edges of the glasses are not true; but the flat surface of connection makes it much more impressive, and by doing away with any chance of telescoping, restricts the experiment to an illustration of the shrinkage of frozen water on melting.

The glasses should be selected of equal diameter at the mouths, and if ground and polished, they are much better. There is no trouble in finding such glasses at any dealer's. Even if the mouths fit poorly, the experiments can be performed by having a wide enough band and by not attempting to use the flat washer arrangement.

Electrical Currents.

We have in the case of electrical waves along a wire a disturbance outside the wire and a current within it, and the equations of Maxwell allow us to calculate these with perfect accuracy and give all the laws with respect to them.

We thus find that the velocity of propagation of the waves along a wire, hung far away from other bodies and made of good conducting material, is that of light, or 185,000 miles per second; but when it is hung near any conducting matter, like the earth, or inclosed in a cable and sunk into the sea, the velocity becomes much less. When hung in space, away from other bodies, it forms, as it were, the core of a system of waves in the ether, the amplitude of the disturbance becoming less and less as we move away from the wire. But the most curious fact is that the electric current penetrates only a short distance into the wire, being mostly confined to the surface, especially where the number of oscillations per second is very great.—*H. A. Rowland.*

AN IMPROVED CLINICAL THERMOMETER.

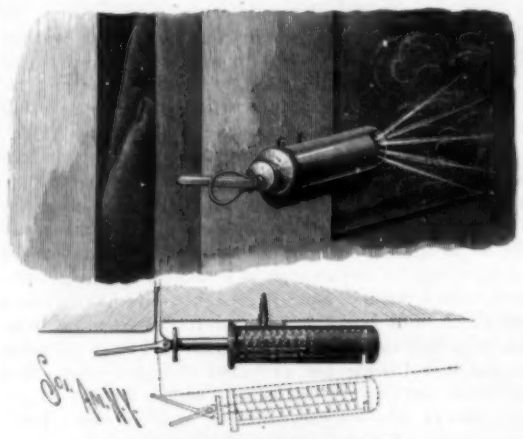
The accompanying illustration represents an improvement in clinical thermometers which has been patented by Messrs. Robert H. Hunstock, of San Antonio, Texas, and Emigdio Chavez, of Guanajuato, Mexico. It is an improved article of manufacture, in which the zero mark of the scale is placed at the normal temperature of the body. Each degree is divided into five or ten parts, according to the size of the instrument, those above zero reading supernormal, and those below that mark being subnormal. If desired, one or two scales may be made to appear upon the same instrument.

HUNSTOCK & CHAVEZ'S CLINICAL THERMOMETER.

AT a recent meeting of the Manchester Section of Chemical Industry, Mr. William Thompson read a paper on the heat-producing powers of twelve samples of coal, determined by burning in oxygen (in the apparatus devised by him), compared with their theoretical values as calculated from their chemical composition. The coal which he found to give the highest results as regards heat producing was anthracite, which gave 8,340 Centigrade units of heat.

AN IMPROVED BURGLAR ALARM.

A device which may be readily attached to a door or window, and is adapted to explode a cap as the door or window is opened, has been patented by Mr. Neil McIntyre, and is illustrated herewith. It consists of a tubular cylindrical body with closed ends in which slides a piston surrounded by a spiral spring, which has a bearing on a plunger at one end of the piston and against the inner side of the cylinder at its other end. One end of the piston rod projects out of the cylinder and is provided with a handle, while upon the extremity of the rod is hinged or pivoted a thin wedge-shaped arm. The end of the cylinder opposite the handle has a transverse slot, and the cylinder itself is adapted to be attached to a door or window by means of a screw



McINTYRE'S BURGLAR ALARM.

which forms an integral portion of the body at the back. The cylinder is screwed on the inner face of a door or window, an inch or so from the outer edge, and the piston rod is then drawn outward, by means of the handle, against the tension of the spiral spring, until the wedge-shaped arm can be carried inward between the door and casing, as the door is closed. A cap is then inserted in the transverse slot in the rear end of the cylinder, where it is violently struck by the plunger on one end of the piston rod when the door is opened, the wedge-shaped arm being thus released and allowing the spring to exert its tension on the piston rod. For further information relative to this invention address the Travelers' Pocket Burglar Alarm Co., No. 200 East Eighty-second Street, New York City.

AN IMPROVED PIANO LAMP BRACKET.

The accompanying illustration represents a piano lamp bracket designed for attachment to an upright piano, and conveniently and readily adjustable to any position desired. It has been patented by Mr. William A. Smith, of Butte City, Montana Ter. A T-shaped plate is attached by screws to the back of the piano, and projecting from this plate beyond the end of the piano is a short arm with a socket, in which is mounted a pivot pin projecting from a horizontal rod, the latter being of sufficient length to extend past the end and in front of the piano. This horizontal rod has a vertical sleeve, through which extends a vertical arm, adjustably held by a set screw. To the lower end of the vertical rod is secured, by an elbow joint, a horizontal rod having at its outer end a socket, in which is secured

SMITH'S PIANO LAMP BRACKET.

the shank of a stand upon which may be placed a lamp. By means of such a bracket the lamp stand may be swung back out of the way when not required for use, or moved to one end of the keyboard, or raised or lowered in its position with regard to the music resting above the keys.

Arrow Poison.

According to Mr. Stanley, the arrow poison used by the natives of the Lower Congo district is made from a species of red ants found in that locality. The ants are dried, crushed into powder and cooked in palm oil. The exceedingly irritating properties of the poison are supposed to be due to formic acid.

AN IMPROVED THILL COUPLING.

The accompanying illustration represents a secure thill fastening, which will not rattle or jar, and with which the thills can be quickly locked in place or removed from a vehicle. This invention has been patented by Mr. George W. Lee, of Homeworth, Ohio. The front end of the coupling iron has a horizontal eye,

LEE'S THILL COUPLING.

in which is a stub shaft, held in place by a set screw, the shaft being bored interiorly and longitudinally to afford facility for lubrication. The thill iron is preferably made of steel, and is bifurcated, having two rearwardly extending curved arms, on the extremities of which are heads, recessed in their inner opposing faces, the recesses being of a size to fit snugly over the ends of the shaft held in the eye of the coupling iron, the arms of the thill iron being sprung apart until they will clasp the ends of the shaft. A locking plate is placed between the arms of the thill iron, preventing the spreading thereof, this plate being attached to a spring bar whose other end is countersunk in the upper face of the shank of the thill iron. To unlock or disengage the coupling it is necessary to slightly separate the thill arms, to effect which a key or releasing tool is provided, which is shown in position for such use in our illustration. By turning the handle of the key upward and outwardly the thill arms may be readily disengaged from the vehicle, a similar use of the key serving to facilitate the engagement of the arms.

For further information relative to this invention address the patentee or Mr. Herbert T. Gould, of Perry, N. Y.

IMPROVED FENDER FOR CAR WINDOWS.

A fender for guarding railway car or vehicle windows from smoke, cinders, or dust is illustrated herewith, and has been patented by Messrs. E. Frank Waller, of Hanson, Ky., and Otto A. Carlstedt, of Evansville, Ind., the small figures showing sectional views of the device. The fender conforms in shape to the top, one side, and bottom outlines of the window, and is of concavo-convex cross-sectional form, preferably of metal, although it may be formed of a flat plate bent twice to the required shape. Each fender is hinged at top and bottom by hinge lugs fixed to the fender and the car body, the hinges being arranged at the center of the panel between two car windows, thus allowing the same fender to be swung around on the hinges to guard either of the two windows from smoke and dust. The lower hinge lug has sockets at its front and rear edges, into either of which a bolt held to the

WALLER & CARLSTEDT'S FENDER FOR CAR WINDOWS.

lower arm of the fender may pass, according to which side of the window the fender may be adjusted. This bolt is guided in staples fixed to the fender, and at its rear end has a stem, on which is a spiral spring, a knob on the bolt providing for conveniently withdrawing it when it is desired to swing the fender from one side to the other. There is also a hook on the inner face of the fender, adapted to be engaged with a staple in the car body, to hold the fender in close contact therewith.

For further information relative to this invention, address E. Frank Waller, M.D., Hanson, Ky.

The Dreams of a Hasheesh Smoker.

Science describes the experiences of a gentleman who placed himself under the influence of a hasheesh. He smoked it until he felt a profound sense of a well-being, and then put the pipe aside. After a few minutes he seemed to become two persons, he was conscious of his real self reclining on a lounge, and of why he was there, his double was in a vast building of gold and marble, splendidly brilliant, and beautiful beyond all description. He felt an extreme gratification, and believed himself in heaven. This double personality suddenly vanished, but reappeared in a few minutes. His real self was undergoing rhythmical spasms throughout his body, the double was a marvelous instrument, producing sounds of exquisite sweetness and perfect rhythm. Then sleep ensued, and all ended. Upon another occasion sleep and waking came and went so rapidly that they seemed to be confused. His double seemed to be the sea, bright and tossing as the wind blew, then a continent. Again, he smoked a double dose, and sat at his table pencil in hand, to record the effects. He lost all conception of time. He rose to open a door, and it seemed to take a million years. He went to pacify an angry dog, and endless ages seemed to have passed when he returned. Conceptions of space retained their normal character. He felt an unusual fullness of mental impressions—enough to fill volumes. He understood clairvoyance, hypnotism, and all else. He was not one man or two, but several men living at the same time in different places with different occupations. He could not write one word without hurrying to the next, his thoughts flowing with enormous rapidity. The few words he did write meant nothing.

A SPRING COVER OILER.

The illustration herewith represents an oiler the cover of which is self-closing, without the screwing on of a cap, as is common with the ordinary oiler. It is manufactured by the Penberthy Injector Company, of Detroit, Mich. As will be seen by this sectional diagram, the cover is held in place by a spring of fine wire which passes down through the oil way and is fastened in its concave, threaded base. The filling of the oil cup is readily effected by lifting the cover against the slight tension of the spring, which of course is always sufficient to keep the cover in place in ordinary use, or even against any considerable jar of machinery, while a cover so attached cannot be lost.

Ten Good Things to Know.

1. That salt will curdle new milk, hence in preparing milk porridge, gravies, etc., the salt should not be added until the dish is prepared.

2. That clear boiling water will remove tea stains and many fruit stains. Pour the water through the stain and thus prevent its spreading over the fabric.

3. That ripe tomatoes will remove ink and other stains from white cloth, also from the hands.

4. That a tablespoonful of turpentine boiled with white clothes will aid in the whitening process.

5. That boiled starch is much improved by the addition of a little sperm salt or gum arabic dissolved.

6. That beeswax and salt will make rusty flat irons as clean and smooth as glass. Tie a lump of wax in a rag and keep it for that purpose. When the irons are hot, rub them first with the wax rag, then scour with a paper or cloth sprinkled with salt.

7. That blue ointment and kerosene mixed in equal proportions and applied to the bedsteads is an unfailing bedbug remedy, as a coat of whitewash is for the walls of a log house.

8. That kerosene will soften boots or shoes that have been hardened by water, and render them as pliable as new.

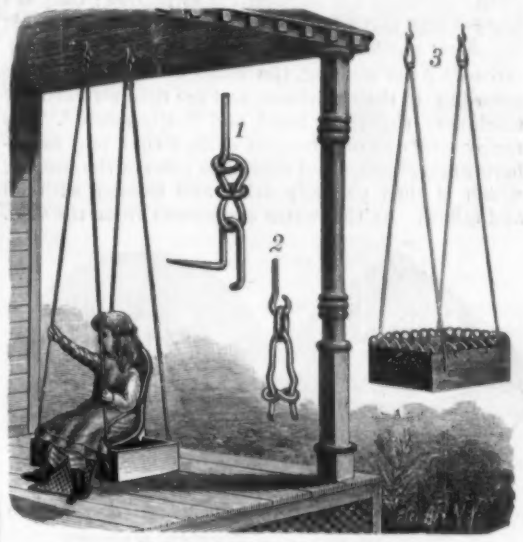
9. That kerosene will make tin tea kettles as bright as new. Saturate a woolen rag and rub with it. It will also remove stains from varnished furniture.

10. That cool rain water and soda will remove machine grease from washable fabrics.—*The Sanitarian.*

A CURIOUS instance of twins, in case of a hen's egg, is reported to us from Crawfordsville, Ga. Mr. C. G. Moore of that city sent us a photograph of an egg that was served on his table and which apparently was perfectly normal, but which when broken open was found to contain a perfectly formed egg with a complete shell within the outer shell. Mr. Moore kindly had a photograph taken for our use, but we do not publish it, as we were unable to reproduce with sufficient accuracy the peculiar formation of the egg.

AN IMPROVED CHILD'S SWING.

The accompanying illustration represents a swing mainly designed to be used in the place of a crib or cradle for infants, as well as for amusement and means of exercise or place of rest for older children. It is a patented invention of Mr. James M. McCord, of Vincennes, Ind. Figs. 1 and 2 represent the upper and



McCORD'S CHILD'S SWING.

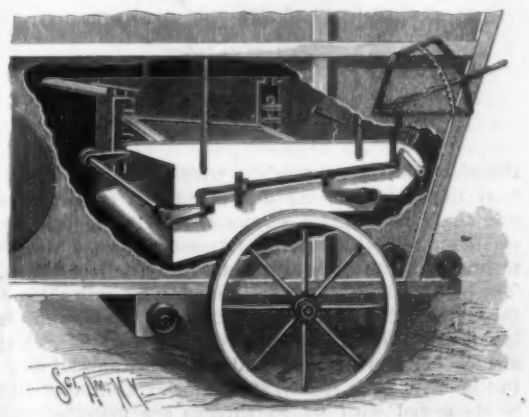
lower end portions of one of the suspension wires, Fig. 3 showing the swing carrying a box at its lower end, having fitted on it a removable raised frame, while the perspective view shows the swing with a seat mounted on the box in place of the removable frame. This frame may be of basketwork or other material of any desired pattern, and when in place is secured by hooks engaging with suitable catches, to provide for its ready removal. The chair has rabbeted cleats on its bottom adapted to rest on and fit within or lap over the sides of the box, to which it is held in place by hooks.

New Process for Detecting the Presence of Foreign Coloring Matters in Wines.

The author uses as a reagent the standard soap liquid used in determining the hardness of waters. Of this liquid 5 c. c. are placed in a small test tube with an equal volume of distilled water. From ten to twenty drops of the wine in question are added, and the whole is mixed by inverting the tube. With a natural wine the liquid remains colorless, but it is colored if some foreign coloring matter is present.—*A. Pagnoul.*

SIEVE ATTACHMENT FOR THRASHING MACHINES.

The invention herewith illustrated relates to an attachment whereby the sieves may be regulated, moved, adjusted, or shifted, according to the work in hand, while the machine is in motion, and is also adapted for use in windmills, elevators, and other machines in which sieves are required. It has been patented by Mr. Wily K. Dodd, of Marengo, Iowa. The device is shown as applied to a thrashing machine having a forward and rear receiver, each furnished with a suitable conveyer, a shoe capable of a longitudinal or a transverse movement being held above the receiver. Front and rear shafts are journaled in the receiver, front and rear vertical slides, having grooves in their inner faces, being connected to the shafts, while a sieve and a tilting lever are connected with the shafts, an adjusting lever being linked to the tilting lever, and a tail board being operated from the tilting lever simultaneously with the slides. Parallel with the forward base of the tail board a rod is secured in the shoe carrying burrs at



DODD'S THRASHING MACHINE ATTACHMENT.

each end, one outside and the other inside of each side of the shoe, which serve to regulate the movement of the tail board in its groove, and by moving the adjusting lever either up or down, the sieves may be raised or lowered.

For further information relative to this invention address Mr. Ralph H. Kirk, Marengo, Iowa.

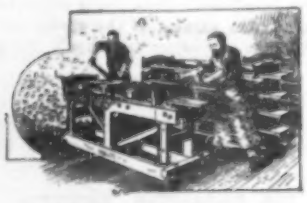
IMPROVED LEATHER BELTING.

For high speed machinery, especially planing machines and dynamos, the very best possible article of belting is required, which shall combine flexibility and strength. The house of Charles A. Schieren & Co., of this city, has devoted special attention to the production of this class of goods. The general routine to which the hides are subjected is as follows: Only the best selected and trimmed oak-tanned hides are used, the center portion of which is cut out and the rest discarded. After soaking, the hides are cut into strips according to their thickness and are then softened by machinery, shaved by hand, and finally scoured. This removes all dirt or remnants of flesh that may be adhering and cleanses and opens the pores of the leather, which is then partially dried and treated with oil and tallow. As the water evaporates from the skin,

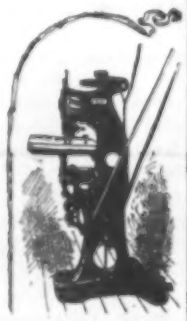
STRAIGHTENING AND CUTTING MACHINE.

the stuffing, as it is called, penetrates the pores and takes its place.

The material of a belt must be pre-eminently unstretchable in order to insure accurate running on the wheels. We give a small view of the machine in which belt leather is stretched. For 24 hours it is subjected to tension, after which it is polished and dried. By shears and cutting machinery it is now cut into the various widths that can be yielded by the skin under treatment. It has next to be fastened. The leather is squared at the joints and carefully feathered off to a sharp edge; the pieces are then cemented and cut into rolls about 300 feet long each. So good and

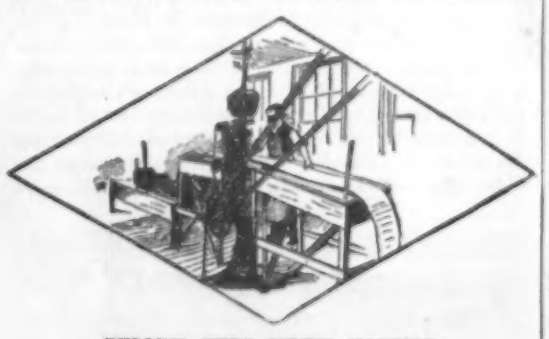


MACHINE FOR STRETCHING BELT LEATHER.



WAX THREAD SEWING MACHINE.

perfect is the cementing that a belt secured by no other means is often used and found thoroughly efficient, but to make it thoroughly reliable for heavy work a better fastening must be used. In the old way it was riveted with copper rivets and burrs, and much heavy belting is made up in that way by the house. But rivets are certainly clumsy, interfere with the smoothness of the belt, and impair flexibility. We



ENDLESS WIRE SCREW MACHINE.

therefore illustrate a machine which marks an important improvement—the use of endless copper wire screws. This machine screws the belt together by small screws, which form extremely strong attachments, that can be multiplied to any desired extent. The belt produced is perfectly smooth on both sides, is far more pliable than one made with rivets, and the layers of leather are held more firmly together. The electric belts for dynamos and motors are now all made in this way. As a special article for export, belts with joints sewed with waxed threads are manufactured also. The high speed belting is perforated in order to prevent air cushioning and to allow the belt to have a full grip upon the driving or motor pulley. This house also has extensive works in Brooklyn devoted entirely to the production of lace leather. Here the brands of Brooklyn and Gowanus raw hide lace leather are made and a special tanned lace leather. Electric engineers find the Schieren belting admirably adapted for their uses on motors and dynamos.

The Best Form of Motor.

The introduction of motors for power transmission will soon be governed by their cost. The questions of reliability, safety, and convenience are all important, but dollars and cents, says *Electric Power*, are the most conspicuous consideration, and this point is by no means overlooked by the manufacturer of motors.

The evolution of a perfect machine of this character is necessarily a slow process. Its original design and construction is in the hands of the inventor and a few practical mechanics. When it is placed in actual service, the modifications begin. It is strengthened in one part and lightened in another. Its construction is gradually simplified. The arrangement of the parts is changed in order to facilitate examination and possible adjustment. Nothing but the lapse of time and the exigences of actual service will develop all the faults and suggest all the improvements which may be made. When practical perfection is eventually attained, special machinery may be devised, which will bring the cost of production down to the lowest point, greatly enlarging the sales, even if the profit on each motor is reduced. This is the natural course through which any line of manufacturing must pass in order to attain the highest degree of perfection.

So long as competition tends toward the production of a better article at less money, it is beneficial, provided it is done at a reasonable profit; when, however, an effort is made to reduce cost by introducing an insufficient quantity of material, or that of an inferior quality, the result is more likely to show loss rather than gain. The high speed at which dynamos and motors are run, and their susceptibility to damage if not properly balanced and fitted, has led up to first class workmanship. Therefore, it seems reasonable to suppose that in this particular branch of the electrical business there is little apprehension of retrogression.

Consanguineous Marriages.

The author of a recent work on this subject calls attention to the curious ideas which have been generally received in reference to the infecundity of and physical degradation consequent on consanguineous marriages. So far as the data given may be trusted—and it is hardly to be supposed that the author holds a brief on the opposite side—there is absolutely nothing to show that marriages between near kinsmen are lacking in fertility, or that they are peculiarly liable to give issue to deformed or diseased offspring. There is no lack of instances of enforced consanguineity, in the matter of marriage, in isolated communities, according to M. Huth, to disprove the assumption that physical degeneration is likely to result from the practice. An investigation into a number of unions between uncles and nieces, nephews and aunts, and cousins in the first and second degree, gives an average of children rather above than below the general average, though this is attributed to some extent to the comparatively early age at which such unions are generally contracted.

Breeders inform us that the results are markedly in favor of consanguineous unions between healthy well-bred animals. Unions between men or animals of widely different varieties, on the other hand, have a decidedly injurious effect on the offspring, and beyond a certain limit are almost absolutely sterile. Mulattoes and the half-breeds of India and America are striking examples of the deterioration to which such racial disparity gives rise. The great point to bear in mind is that the union of individuals with the same morbid tendencies intensifies the taint, and that, too, quite irrespective of any consanguineity. The moral, according to the author, is that the reasons which have led to the prohibition of marriages within certain degrees of relationship are social, and not physiological.—*Medical Press and Circular.*

What will the End Be?

J. E. Thickston, a scientist and astronomer, living at Metuchen, N. J., while alluding to the Johnstown horror, said to a *Herald* correspondent that the dreadful catastrophe was as nothing compared to what might have occurred.

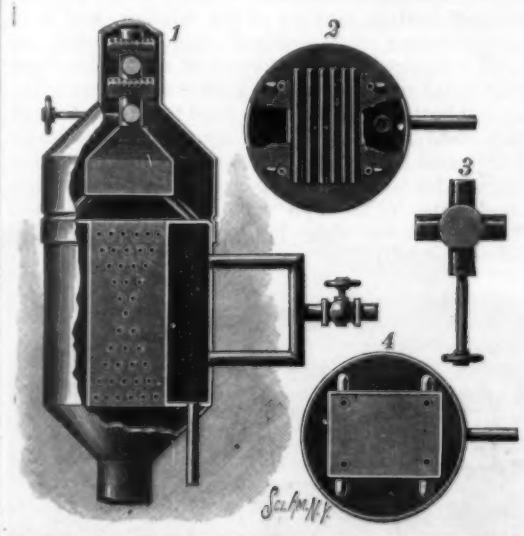
"The news from Central Pennsylvania is awful," he said, "but this may be a very little thing compared with what may yet occur. Near and west of the Alleghanies a great opening within the earth's crust must be made somewhere by the escape of natural gas. Will the earth settle and fill the empty places, or will air pass in and thereby make it possible for the immense reservoirs of gas, stored away, no one knows how far, to explode and make an upheaval? Many people believe there is gas enough under Western Pennsylvania and Eastern Ohio to blow the country from Lake Erie to the Monongahela into promiscuous fragments. When oil was struck at Oil Creek in 1859, timid folks feared a collapse and a sinking of the oil field, but that danger was obviated by water running into the wells as the oil ran out. The dreaded vacuum never came, as water took the place of the removed oil. It is not so in this case. Water is not filling up the gas wells, except to a limited extent. What the outcome may be is not really a very enjoyable thing to revolve in our minds these pleasant June mornings. A submerged valley, lined with the bones of fifteen thousand men, women and children is a fearful thing in the history of the human race, but what of that compared with a wrecked continent? What of that compared with a world blown open or blown to fragments? I am not an alarmist or a sensational Wiggins. I do not believe that old Mother Earth is about to be shot into smithereens, but there may be danger ahead in this direction, and although we grieve over the Conemaugh catastrophe, let us be thankful that there has not been a natural gas explosion out West, and that there are not two rings instead of one set of asteroids in the material heavens."

THE NEW RUBBER TIP PEARL MUCILAGE BOTTLE.

In our issue of June 9, 1888, we described the new rubber tip mucilage bottle recently introduced by the Nassau Manufacturing Company, of this city. The tip is now perforated only on one side, so that no air can enter, and consequently no portion of the contents can possibly escape. This simple modification makes the Pearl Mucilage Bottle perfect. There is no evaporation, as the slit is always closed. The amount that is delivered in use is enough and not too much. No attention is required, and where real pasting in quantity is to be done, its good qualities appear best.

AN APPARATUS FOR HEATING AND STEAMING GRAIN.

The apparatus represented in the accompanying illustration is more especially designed for treating wheat, so as to toughen its hull and produce a better bran, an increase of middlings, clearer flour, and whiter break-flour. The invention forms the subject of a patent issued to Mr. William H. Smith, of Hickman, Tenn. Fig. 1 is a sectional side view of the apparatus, and Figs. 2 and 4 are plan views in different sections. A central drying chamber is supported within an outer steam vessel, steam being supplied to the latter from any suitable source by means of two side pipes, the steam also circulating through pipes extending transversely through the drying chamber, as shown in Figs. 1 and 2, while the water of condensation is carried off by a pipe at the bottom. From the top of the steam vessel pipes lead to an upper steam chest above the drying chamber, the upper end of the steam chest being connected with a pipe extending a short distance into the grain supply pipe, this steam pipe being closed at its upper end. In the bottom of this pipe is a valve, and in the pipe are a number of horizontally extending perforated pipes, as shown in Fig. 3, whereby steam may be furnished as desired to steam the grain entering the supply pipe, or entirely cut off therefrom when



SMITH'S APPARATUS FOR HEATING AND STEAMING GRAIN.

the grain is only to be dried. The arrangement of the pipes in the drying chamber permits only a slow movement of the grain to its central discharge spout at the bottom, so that the grain is thoroughly heated and dried in its downward movement.

The New National Zoological Garden.

During the last session of Congress the sum of $200,000 was appropriated for the establishment of a zoological garden in Washington. The necessary site for it has now been selected. It comprises about 150 acres, lies to the northwest of the city, about two miles from the White House, along the banks of Rock Creek, and is said to be admirably situated and in every way well adapted for its purpose. It is expected that before next winter the necessary arrangements will be so far advanced that the animals now inappropriately housed in the grounds of the Smithsonian Institution can be removed to their new quarters.

Correspondence.

A Need for Oxide of Titanium.

To the Editor of the Scientific American:

The oxide of titanium is essential in giving the yellow color to porcelain teeth. It seems of late to have become very scarce. It is not to be obtained in Boston, and a quantity lately purchased in New York is colorless and useless. Can you help us out? T. H. C.

Cambridge, Mass., Harvard University, Dental Dept.

Tree Killing Composition Wanted.

To the Editor of the Scientific American:

A man or animal can be fatally inoculated with poison by a subcutaneous injection. Now, I want to know whether it is possible to do the same with a tree. To kill superfluous trees by girdling requires a good deal of labor. Is there not some substance that could be placed in an auger hole that would kill the tree?

Pueblo, Col. AN OLD READER.

The Bowers Dredge at Tacoma.

To the Editor of the Scientific American:

The Bowers dredge recently illustrated and described in the SCIENTIFIC AMERICAN is now in Tacoma, having arrived in tow of the tug Vigilant, after a perilous voyage, in which the dredge narrowly escaped wrecking. It will be employed in channel work and reclaiming of land for the N. P. R.R. The owners expect to be employed in this vicinity for three years, or until the dredge is worn out. CHAS. R. MOYER.

Tacoma, W. T., June 12, 1889.

Bursting Dams and Floods in Geology.

To the Editor of the Scientific American:

A question of geographical interest arises out of the bursting of the Johnstown dam. The plains of the Upper Indus are said to be strewn with angular blocks —not rolled by ordinary river action—and their presence has been explained by the supposition that huge land slides, having from time to time formed dams across the mouths of mountain gorges in lower Cashmir, created temporary lakes, and that when these pent-up waters, overtopping the dam, let themselves loose they were mixed with sufficient earth to form a flood of density enough to carry with it debris equal to glacial moraines.

How far was this flood visible down the Ohio, and how far were heavy blocks carried by the muddy waters? I remember when Mt. Leathers dam burst above Sheffield, England, the flood wave was felt for a great distance. G. DARBISHIRE.

Zolfo, Fla.

The Recurved Double-Fanged Climbing Rattlesnake.

To the Editor of the Scientific American:

In the recent issue of the SCIENTIFIC AMERICAN of May 11, on page 295, is an article from the pen of C. Few Seiss, Esq., on the poisonous serpents of the United States. He has omitted entirely to mention a very important species of rattlesnake, which was first described by Audubon, and named by him the "Recurved Double-Fanged Climbing Rattlesnake." This snake has *double* instead of *single* fangs on each side of the upper jaw, and *they are recurved in shape;* and it also climbs bushes and small trees, in search of food, such as young birds, etc. I have myself killed and specially examined two specimens of this snake in my own immediate neighborhood.

The last specimen I killed only recently, and gave it to a gentleman who wished to send it to a friend in St. Louis. Will you please let me know if the snake I have described is really a *rarity* in the northern and western portions of the United States?

F. W. COLEMAN, M.D.

Rodney, Miss., June 16, 1889.

Machinery Wanted for Making Cassava Starch.

To the Editor of the Scientific American:

The cassava grown in Florida is of the sweet species. Its root yields tapioca—starch or gluten—and a nutritive bran for stock. Heretofore small patches of the prolific root have been dug when required for home consumption, and occasionally an industrious housewife will grate by hand and clarify a few pounds of starch for the store. Now, however, the immense yield (about forty tons per acre) has led to the planting of considerable areas in Polk County, and the question of saving and systematically handling this weighty crop will puzzle the farmer this autumn.

Last year I rigged up a revolving grater to run by foot treadle, and kept a boy washing dirt off the roots as long as my legs would hold out. Now, I want some of your readers to suggest a machine (for one mule power) which will:

1. Wash the roots as they come from the field.
2. Disintegrate them (grating is preferable to slicing or crushing).
3. Saturate the pulp, and let the water full of starch drain off into settling tanks through fine screens, which screens must deliver the bran drained, to be dried ready for barreling.
4. To dry the settlings or cakes of starch after the clear water has been drawn off. Could chemicals be added to bleach and whiten the starch?

G. DARBISHIRE,
Chief Engineer for Peace River Phosphates.

Fort Meade, Fla., June 17, 1889.

Facts Concerning Flour Production.

To the Editor of the Scientific American:

We quote from your issue June 8: "88,200 barrels of flour is the report of a recent one week's work for the mills of Minneapolis. Is there any other place in the world where such a large production is realized?" Permit us to say that we think not. St. Louis, however, comes nearest, making, or having capacity to make, 12,025 barrels daily, or 72,125 barrels per week of six days. The Minneapolis mills, twenty-two in number, have a daily capacity of 37,475 barrels, or 224,850 barrels per week of six days. Pillsbury & Co. and Washburn, Martin & Co. can make respectively 10,900 and 8,300 barrels per day, or together 115,200 barrels per week. Minneapolis' heaviest week was a little over 182,000 barrels, while the figures you give are below the average six days' work.

HILL & SCHAAFF, *Millers' Agents.*

Richmond, Va., June 10, 1889.

Why Engineers Should Study.

Granted that owners are sometimes short-sighted and are over-inclined to value your services in inverse ratio to the money you demand for them. Do you intend always to work in the same place? Do you not rather cherish the honorable ambition to better your condition whenever opportunity offers? Do you ever stop to consider the great changes which have taken place in the character of the steam plants of this country, and that the change is still going on in a constantly accelerating ratio? Some one has well said that there is always room at the top; and in the stationary engineer's trade this room at the top is growing larger all the time. Think the matter over, and you will soon be convinced that not one of the mechanical trades has in it more of possibilities for the future, or offers more encouragement to hard study, patient industry, and steady application than the one you have chosen.

It is not so very many years since the old fashioned slide valve engine, with its box bed and throttling governor, was to be found in nearly every engine room. Now it is hardly thought of except for the smallest and cheapest plants. It is scarcely a dozen years since the first successful attempt was made to build Corliss engines in the West. To-day there are dozens of builders of this and other types of high duty engines. The automatic cut-off engine has driven the slide valve out of the market, except for small powers. Compound engines are common, and triple and quadruple engines are not only being talked of, but are being placed in operation, and will undoubtedly be as generally used in stationary practice as they are now in marine engineering. Thousands of first-class plants are in daily service, and the demand is growing steadily. Every one that is put in service calls for skilled attendance and furnishes work for a good engineer. The signs of the times all point to a continuance of the attempt at still further improvement in the economy and efficiency of the modern high duty steam plant. As a natural result the demand for skillful, educated engineers is increasing. Not only this; but the number of first-class power plants is rapidly increasing to meet the manifold requirements of our later day civilization. Every new application of electricity to supply the necessities or luxuries of life, every lighting station, every central power plant, every one of the thousand and one new developments within the bounds of near probability, calls for economical power, and every plant of this character furnishes employment for a good engineer. Naturally, the engineers who study the hardest, and are the most thoroughly posted in the practical details of their trade, will get the best positions; and the best positions are worth working for. Are these not good reasons why the engineer should educate himself in the theory and practice of his trade?—*Stationary Engineer.*

AN ingenious and determined attempt to intercept the signals passing along the Marseilles cable of the Direct Spanish Company was recently discovered in the course of some repairs to the underground lines in the streets of Barcelona. The superintendent found that at one spot the ground had been undermined and the four cables cut, the conductors on both sides being connected to insulated wires, which were taken to the wall of the house opposite. Outside this house the leads from each cable were connected together by a binding screw, so that communication between Marseilles and Barcelona was not interrupted. A careful inquiry was at once instituted by the authorities, and it was speedily discovered that the wires had been, at a period which can be traced, led into the cellar of the house opposite the mine, the hole in the wall having since been carefully bricked and plastered up.

PHOTOGRAPHIC NOTES.

To Remove Yellow Stains from Negatives.—A correspondent in Sivas, Turkey, says it will require several days' journey in his distant land to consult a professional photographer in regard to the information he seeks, and asks the SCIENTIFIC AMERICAN to tell him how to remove successfully a yellow tinge on one end of a valuable negative.

The cause of the stain is probably due to insufficient fixing of the plate originally. Hence the treatment is different than if it was a pyro stain caused during development. The latter stain can be removed by immersing the plate in a clearing solution composed of:

Alum	2 oz.
Citric acid	1 "
Water	10 "

for several minutes. The plate should be soaked in water for 10 minutes prior to being placed in the above, provided it has been dried and printed from.

Another formula for removing silver stains produced in printing from ordinary silver paper is to mix two solutions:

a. Sulphocyanide of ammonia		½ dr.
	Water	1 oz.
b. Nitric acid		½ dr.
	Water	1 oz.

Mix equal parts of *a* and *b*, fresh for each negative, and apply to stained portion or immerse the negative in the solution. When the stain disappears, the negative should be washed and followed by an application of a saturated solution of chrome alum.

When the stain is caused by insufficient fixing, it is said to be removed by converting the silver in the film into an iodide and then dissolving out by cyanide of potassium. The method recommended by Mr. Drake is as follows: Soak the plate for five minutes in clean water, meanwhile make a solution of iodide of potassium, 20 grains to the ounce of water, now put the plate in this solution, and let it stay for ten minutes. If the stain is very old, keep it in for half an hour. Now dissolve half a drachm of cyanide of potassium in one ounce of water. Take the plate and put into this, and gently rub the stains with a tuft of cotton wool (absorbent filtering cotton will do), free from grit, until they are quite gone. If the stains are very old, make the solutions stronger, and soak for a longer time.

The stain due from insufficient fixing is usually very difficult to remove. A plan which we have thought of, but not yet tried, is to change the color by slight intensification.

First immerse the plate in a weak solution of bichloride of mercury and water until the film commences to bleach.

Then wash and immerse in a solution of cyanide of silver similar to Monkhoven's formula. The cyanide of silver converts the film into a bluish color and might also transform the yellow stain in the same manner.

Black Negative Varnish.—A simple way is to dissolve two grains of lamp black in half a drachm of turpentine, then add it to the clear negative varnish, shaking well at each addition to insure thorough mixing. If the quantity is too small, add successive amounts of the black until the requisite color is reached.

A New Transparent Film.—We are informed that by a recently perfected process, transparent celluloid only 3-1000 of an inch thick can now be easily manufactured, capable of rolling up like paper. On the film thus made the sensitive emulsion is spread. The film is exposed in the camera and developed the same as a gelatine plate, and when done is ready to be printed from. It is to be made by the Eastman Company, of Rochester, N. Y., who have introduced bromide paper so largely in this country.

Platinum Toning Bath for Gelatino-Chloride Paper.—In Dr. Liesegang's interesting journal, *Der Amateur Photograph*, Mr. Alfred Stieglitz gives the following platinum toning process for gelatino-chloride printing out paper (known as aristo paper):

a. Neutral oxalate of potash	2 parts.	}	166·66 grms.
Phosphate of potash	1 "		
Water			1,000 c. c.
b. Potassium platinous chloride	1 part.		
Water	20 "		

For use are mixed, just before toning, 6 parts of A with 1 part of B. The prints are as usually at first washed out, and then toned. To obtain a black tone, the prints are allowed to remain for twenty-five to forty minutes in the solution without moving. They will acquire in the toning bath a bluish violet tone. After fixing, however, the blackish tones will be observed. The prints treated with this bath will keep better than prints toned with gold, as they are not affected by sulphureted hydrogen and similar gases. They are fixed and washed as usual. M. Stieglitz promises to continue his experiments.—*Mr. H. G. Gunther, in Photo. News.*

THE WASHINGTON ARCH OF NEW YORK.

We give in the present issue a view of the Washington Triumphal Arch, which, during the recent centennial and for some weeks thereafter, stood at the lower end of Fifth Avenue in this city. It was erected by residents of North Washington Square and of Fifth Avenue below Fourteenth Street. Mr. William R. Stewart, who is now treasurer of the fund for the erection of a permanent arch, deserves much of the credit for originating the idea and for collecting the funds necessary for carrying it out.

The arch stood about 100 feet north of Washington Square, spanning Fifth Avenue from curb to curb. It was designed by Mr. Stanford White, of the firm of McKim, Mead & White, architects, of this city. The material was entirely wood for the main structure, while for its decoration *papier mache* was used. A frieze of garlands and wreaths of laurel were employed in this, carrying out the colonial style of architecture. The general design, however, followed the regular type of triumphal arch. As it was necessary to avoid obstructing the sidewalks, the piers were made considerably narrower than would have been in accord with the other proportions. If the same design precisely were carried out in stone, it is thought that a tie rod would be necessary to preserve its integrity and to resist the thrust of the arch. It was painted white, so that it resembled a marble structure.

The general idea was to preserve the colonial type, itself a modified classic style of architecture, in order to make it harmonize, not only with the days of Washington, but with the locality in which it stands, as the residences upon the park are among the oldest in the city, and present many features of the colonial epoch.

The dimensions of the arch were these: Width of archway, 41 feet; height to spring of arch, 23 feet; height of archway, 43 feet; height to cornice, 55 feet; entire height, inclusive of statue on apex, 71 feet; entire width of arch, 51 feet.

During the centennial period the arch was illuminated by rows of incandescent electric lights driven from a dynamo placed in an adjoining yard; and four bunches of flags were arranged as trophies at the spring of the arch, containing the flags of many nations blended with our own. On the front and rear of the arch resting upon the keystone were placed two large stuffed specimens of the American bald-headed eagle, the larger of the two measuring seven feet six inches from tip to tip of the extended wings.

A very interesting feature was the statue of Washington which stood upon its summit. This was a painted wooden image, ten feet in height, representing Washington in Continental uniform. He appeared as wearing a blue dress coat with brass buttons, buff breeches, and riding boots. This statue is a veritable antique. It is said to have been placed upon the Battery in 1792. It was obtained as a loan for the purposes of the arch through Mr. Sypher, the well-known dealer in art goods, of this city.

The appropriate design and beauty of the arch were so manifest that the centennial committee on art organized a special committee to collect subscriptions for the permanent reproduction of the arch in stone. The new committee includes Henry G. Marquand, chairman; Louis Fitzgerald, vice-chairman; Richard W. Gilder, secretary; and William R. Stewart, treasurer. The following determination has been reached and will be adhered to in the matter:

A total of $100,000 is to be collected and devoted to the erection of the arch; it is to be made of marble; and is to be erected in the neighborhood of Washington Square; it is to be called the Washington Arch; and is to be designed by Stanford White. The four last conditions are absolute. It will of course be somewhat modified from the present design, which could not well be reproduced in stone, and it may be erected on the other side of Waverley Place, in order to obtain increased room for the piers. The hope is expressed that, being placed so far south, it shall be the first of a series of civic decorations which shall ultimately extend throughout the length of the city. Over $46,000 has already been collected, and when $50,000 shall have been accumulated, work will be definitely begun, as the collection of the balance will then be a matter of time only.

THE WASHINGTON ARCH OF NEW YORK.

The Elevated Steam Street Railways, New York.

Regarding the speed attained on the elevated roads Mr. T. C. Clarke says: "The average of several trips on the Third Avenue elevated, between South Ferry and One Hundred and Twenty-seventh Street, timed by me, gives with ordinary five-car trains—seats filled, but few standing—as follows: Distance, 8·40 miles; total time, 47 minutes—10·89 miles per hour; deduct 26 stops at 20 seconds each (8 minutes and 40 seconds)—38 minutes 20 seconds running time between stations, equaling 13½ miles per hour. In this case there were no delays and the train ran rapidly; with heavy trains, slippery rails, etc., this time is reduced to 10 miles per hour.

"When the trains are running at full speed, they average from 18 to 23 miles per hour, varying according to weight of train, direction of grades, etc.

"The time between 23 and 10 miles per hour is lost by getting up full speed and slowing down."

By the cable roads in Chicago, the actual running time from Madison to Sixty-seventh Street, on State Street, is a mile in every 5 4-7 minutes, or, for the full seven miles, 39 minutes, and it must be borne in mind that the cars stop anywhere along the route to take up or let down passengers.

Experience of a Balloonist.

Professor King gives interesting accounts of obstacles in the way of the upward progress of the air ship. Snow is a great obstacle. It gathers on the balloon and weighs it downward. The clouds are sometimes as much as 3,000 feet thick. Often even above such a body of cloud may be seen smaller clouds with clear spaces in between. When within one of these spaces, the sensation is that of being in a vault. With the solid snowy clouds below you and the smaller clouds around you being by perspective brought close around, it appears as if you were in a cavern. I have been above the clouds during a snow storm, and the light of the moon shining so brightly through the rarefied air produced an illumination rather supernatural. I have very frequently passed through frozen clouds. This is where vapor has fallen below the freezing point and been congealed into a substance resembling flour in appearance. This falls, and in doing so reaches a higher temperature, where the small particles are aggregated into flakes of snow. Some clouds, however, present very much the appearance of a veil, and objects on the earth can be distinctly discerned from a position above them. I have never known of an instance in which a balloon was hit by lightning. The thunder does not make a perceptibly greater noise than when you are on the ground. The sound proceeds from the upper layers of clouds, as does also the rain; and in many cases, when the lower strata appear very violent, perfect quiet there reigns except for such motion as is produced by the rain falling through from above. The upper currents are most active, and a cyclone or a wild storm is perhaps produced according as those upper currents descend to or remain above the earth.

THE VARI IN THE BERLIN ZOOLOGICAL GARDEN.

The lemur may be considered the connecting link between the ape and rodents; the construction of the hands and feet reminds one of the former, and that of the body, and in some cases of the jaw, reminds one of the latter. The marking of the lemur is very striking; as is well known, the Romans believed that they were the departed souls of the dead, for the propitiation of which the lemuria—midnight fetes—were celebrated. Like true ghosts, these wandering souls shunned the daylight, carrying on their mischief during the night. From these creatures which shun the light the lemurs took their name; they are truly creatures of the night, and do not lose this peculiarity when in captivity. The lemurs in the Berlin Zoological Garden and the Aquarium sleep the greater part of the day, in spite of all the disturbance caused by visitors; when night closes in and the lights are put out, they become gay, rushing nimbly about their cages.

The vari (*Lemur varius*) belongs to the rarer specimens of this family. It attains a length of about three feet, including the tail, which is about half the whole length. The marking of the specimen shown in the accompanying illustration is very regular, black and white alternating, for only the bushy tail is entirely black; but in many varis the distribution of color varies. The face framed in long white hair and the sharp eyes give the animal a peculiar appearance. The black, dextrous hands bear an unpleasant resemblance to the corresponding members of the human body, and everything done with them, even the catching of running and flying insects, is accomplished with absolute certainty. The varis live in large companies on the island of Madagascar, where they make nightly excursions, uttering horrible cries. Their food generally consists of fruits, although they will gladly eat a live bird or other dainty morsel. They are not very intelligent, and are always very shy, taking flight on the slightest provocation. When in captivity they soon accustom themselves to their keeper, and are very gentle and good natured, but a loud word is enough to confuse them.

All lemurs have the power of creeping about noiselessly like a cat, going around straw, little stones and dried leaves so as not to disturb their prey.

The young vari, which is perfectly developed at its birth, clings so close to the mother as to almost disappear in her fur.—*Illustrirte Zeitung.*

THE VARI IN THE BERLIN ZOOLOGICAL GARDEN.

How to Make a Good Floor.

Nothing attracts the attention of a person wishing to rent or purchase a dwelling, store room, or office, so quickly as a handsome, well laid floor, and a few suggestions on the subject, though not new, may not be out of place.

The best floor for the least money can be made of yellow pine, if the material is carefully selected and properly laid.

First, select edge grain yellow pine, and not too "fat," clear of pitch, knots, sap, and split. See that it is thoroughly seasoned, and that the tongues and grooves exactly match, so that when laid the upper surfaces of each board are on a level. This is an important feature often overlooked, and planing mill operatives frequently get careless, and in adjusting the tonguing and grooving bits. If the edge of a flooring board, especially the grooved edge, is higher than the edge of the next board, no amount of mechanical ingenuity can make a neat floor of them. The upper part of the groove will continue to curl upward as long as the floor lasts.

Supposing, of course, the sleepers or joists are properly placed the right distance apart, and their upper edges precisely on a level and securely braced, the most important part of the job is to "lay" the flooring correctly. This part of the work is never, or very rarely ever, done nowadays. The system in vogue with carpenters of this day of laying one board at a time, and "blind nailing" it, is the most glaring fraud practiced in any trade. They drive the tongue of the board into the groove of the preceding one by pounding on the grooved edge with a naked hammer, making indentations that let in the cold air or obnoxious gases, if it is a bottom floor, and then nail it in place by driving a six-penny nail at an angle of about 50° in the groove. An awkward blow or two chips off the upper of the groove, and the last blow, designed to sink the nail head out of the way of the next tongue, splits the lower part of the groove to splinters, leaving an unsightly opening. Such nailing does not fasten the flooring to the sleepers, and the slanting nails very often wedge the board so that it does not bear on the sleeper.—*Exchange.*

Electricity on War Ships.

Electricity on ships of war is purely an American idea, and was first tried on the United States steamer Trenton in 1883, says the New York *World.* Soon after the system had been tested the vessel sailed on a three years' cruise, and attracted much attention as the first vessel afloat to be lighted by electricity. The success of the Trenton's experiment practically settled the question in naval circles. Through the exertions of Lieut.-Commander R. B. Bradford, who was the Trenton's executive officer, electric lights were placed on the Vermont, New Hampshire, Omaha, Dolphin, and Chicago. The Baltimore, Charleston, Yorktown, Bennington, and Concord will be supplied with the latest improved plants, and there is nothing afloat that can excel the system. Each cruiser has about 500 lights, and the gunboats about 250, with sufficient supplies to last three years. All the cut-outs and switches are made water-tight, and tested by turning a stream of water on any part of the circuit.

There are innumerable devices by which electricity is made useful on board ship. The value of the search light cannot be estimated, as scouting parties, torpedo boats, or swift steam launches can be detected a mile away on the darkest night. As a motive power for small machines it is invaluable, and on the Chicago will be brought into play for training the huge guns of the main battery. It is used also for discharging the rifled ordnance, and the entire system is under the absolute control of the commander from his position in the fighting tower. He requires no uncertain assistants to place him in communication with the various departments of the complex machine. Electrical devices perform all the duties, transmit the orders and control the movement with far greater accuracy and safety than would be possible by the old methods.

The simple pressure of a button endows the huge monster with life and activity, causing 10,000 tons to glide smoothly through the water at a speed of 20 knots. At the touch of a second button the great shields swing noiselessly aside and the huge apertures are disclosed, filled the next instant by powerful rifled breech-loaders. There is a hush, a moment of expectancy, as the commander peers through the little slot on a level with his eye in the tower, touches a third button, and the cruiser vomits forth sheets of flame. The long steel shot dart through space at the rate of 2,000 feet in a second. Bow, stern, and broadside respond in one terrific roar, and, crash! the fabric trembles 'neath the simultaneous explosion of 6,000 pounds of powder, and 12,000 pounds of metal are sent whizzing through the air by means of the electric slave of the dynamo.

The merest motion of the little polished lever directly in front of the capstan brings the powerful search light into action, and sends a dazzling beam through the dark void. To the left protrudes still another concave, innocent-appearing globe, which controls a silent though potent and death-dealing auxiliary. A slight click is heard, a puff of white smoke, and the Whitehead torpedoes glide from their smooth tubes, and are driven through the water at the rate of thirty miles an hour. An electric bell signals the officer in charge of the quick-firing and machine guns when to play his part, and ere the gong has ceased to vibrate, thousands upon thousands of explosive projectiles are flying through the air at the rate of 1,900 feet per second.

The latest electric appliance is a system of engine room telegraph, invented by J. B. Wallis, an Englishman. It has been thoroughly tested in the royal navy, and adopted on her Majesty's ships Camperdown, Rodney, and Aurora. It is also being fitted to the Magicienne and the Marathon, two second class twin-screw cruisers. The Wallis system comprises an engine room telegraph, a revolution-order telegraph, and a steering telegraph, the principle being the same in each case. The engine room telegraph consists of a combined transmitter and reply indicator, inclosed in a case mounted on a pedestal. This instrument has a dial, around which the orders to be transmitted are distinctly marked, and a handle at the back turns a pointer to the desired command.

The moving of the handle or lever gives the "attention" signal to the engineer. The engineer putting his lever over causes a bell to be sounded on the bridge, which calls attention to the fact that he is acknowledging the order and repeating it back. The revolution telegraph is a simple means of transmitting to the engineer the number of revolutions at which the commander wishes the engine to run. The admiral may signal to the fleet that he is going at seventy revolutions, which signal has to be repeated to the engineers, in order that all the vessels may keep in line with the flagship. The steering telegraph is another application of the same principle. The transmitter and receiver are similar to those of the engine room telegraph, the latter being ingeniously attached to the rudder, which makes the record automatically.

In connection with the steam steering wheel, which in the fighting tower of an ironclad is directly under the commander's control, he has at his disposal a terrible and decisive weapon, once it is put in motion. Projecting a number of feet in advance is the ram attachment, its proportions and deadly qualities concealed under water. Emerging from whirling clouds of battle, guided by the will of the commander, the great fabric, impelled by the combined strength of the immense engine, with furnaces glowing and steam hissing, the cruiser rushes straight onward, prepared to crush into its opponent.

The Egypt Exploration Fund.

Few educational enterprises have yielded larger results for the amount invested than the Egypt Exploration Fund. Expending annually since 1883 between $7,000 and $8,000, it has discovered or disclosed the following interesting sites: Pittrom (the treasure city of Exodus i. 11). Goshen Tahpanhes (the Daphnæ of the Greeks), the city of Onias, Zoan, Am, Naukratis, and latest of all, Bubastis (the Pi-Besetti of the Scriptures). These discoveries have been conducted in a thoroughly scientific manner and have yielded rich results regarding the sciences, arts, and industries of past ages, the early sources of Greek history, and particularly Biblical and secular history.—*The Chautauquan.*

RECENTLY PATENTED INVENTIONS.

Engineering.

SPEED INDICATOR.—Albert R. Sherman, Pawtucket, R. I. Combined with a clock is a graduated traveling dial or scale of annular shape, which rotates around the clock dial and is actuated by the impulses from the engine, there being novel means for transmitting the impulses of revolution from the engine to the annular dial, for comparing the speed of the engine with that of the clock.

PISTON ROD GUIDE.—Daniel W. Umstead, Earlington, Ky. This invention relates to an improvement especially adapted for use with mining machinery, dispensing with the crimp and crimp plate usually employed to prevent the air from escaping around the piston rod and sleeve head, and providing a sectional bushing at the outer end of the sleeve, with other novel features.

Railway Appliances.

SANDING DEVICE.—James Ritchie, Flatbush, N. Y. This invention consists essentially of a sand-receiving box or hopper in connection with which is arranged a gate or valve, with means for throwing the gate or valve, and a delivery spout or chute, the construction providing for the delivery of the sand, whether it be wet or dry, at the will of the operator.

AUTOMATIC SAFETY SWITCH.—John H. Walt, Junction City, Oregon. Combined with a main rail laterally movable and a parallel switch rail attached thereto and movable with it, is a stationary outwardly curved main rail, an inner fixed guard rail, and a rail point intervening between the guard and fixed main rail at one end, the construction being such as to prevent derailment at the switch irrespective of the position of the switch.

Electrical.

GENERATING ELECTRICITY.—Timothy Gleeson, Brooklyn, N. Y. This invention provides an apparatus for generating electricity suitable for telephonic currents or for operating bell signals, providing means of vibrating a permanent magnet by clockwork or other motor to generate the current.

CARBON FILAMENTS.—Theophilus V. Hughes, of Holywell, North Wales, and Charles R. Chambers, of South Kensington, Middlesex County, England. This invention covers a method of manufacture of the filaments by the destructive distillation of a gaseous carbon compound capable of yielding carbon when decomposed by heat, the object being to produce filaments of greater density and homogeneity than those made by the ordinary methods.

Mechanical.

SAW DRESSING DEVICE.—Walter Kirkpatrick, Marinette, Wis. This is an implement for side-dressing saw teeth, its body having a handle at one end and a guide block or fork detachably secured to the opposite end, while a lever fulcrumed upon the inner face of the body is provided with a guide screw and a detachable file, the implement being one which can be applied to a circular or band saw while in motion.

LOOM PICKER STAFF CONNECTION.—John McGinnis, Valatie, N. Y. This is a combined metallic stirrup and strap of leather or other like flexible material as the connection between the rocker of each picker staff and its treadle, to prevent breaking of the strap and stopping of the loom, as is now common.

PAPER PULP DIGESTER.—Henry W. Stebbins, Monico, Wis. This is a novel construction of lead-lined boilers, dispensing with all hard metal rings between the sections of the body of the sheik flanges, and clamps, operating to compress and thin the lead lining at the joints and to bulge out the lead beyond the joints in the body sections, the expense of operating the digester being also reduced and leakage avoided.

SOLE SEWING MACHINE.—Johannes Albrecht, Carmstadt, Wurtemberg, Germany. This invention covers an improvement in that class of machines which produce a double lock stitch, and is designed to sew the sole on to the boot or shoe, etc., with waxed threads, by means of a hook needle and a suitable shuttle.

MIDDLINGS PURIFIERS.—William Klostermann, Young America, Minn. Two patents have been granted to this inventor on middlings purifiers, the inventions covering various novel features and combinations of parts, and being improvements on former patented inventions of the same inventor, designed to promote efficiency of their operation, and whereby the middlings are agitated over and over again in order to thoroughly purify them, always separating the worthless stuff from the middlings.

Agricultural.

SEED PLANTER AND FERTILIZER DISTRIBUTER.—Whitmon A. Holt, Harrison, Mo. The frame has a central plow, with side plows held parallel thereto, chutes opening on the rear end of the plows and supported by a plate from the main frame, while a disk is also held to oscillate on this plate, the disk having openings registering with openings in the plate, and a fertilizer and seed hopper are held on the disk, the machine being arranged for changing the distances between the several hills or drills.

Miscellaneous.

ALBUM CLASP.—Ernst P. Hinkel, Offenbach-on-the-Main, Germany. This is a clasp designed to automatically adjust itself to the different thicknesses of the book as the number of photographs inserted therein increase, and is formed with a combination of two telescopic sections with a spring secured in one section and adjustably connected to the other section.

PIANO LAMP BRACKET.—William A. Smith, Butte City, Montana Ter. This bracket consists of a four-armed base plate with a horizontal arm on which is a sleeve pivoted to one of the arms, while a vertically adjustable arm is secured in the sleeve, and has a horizontally projecting member carrying a lamp stand.

MOTOR.—Charles J. B. Gaume, Brooklyn, N. Y. This invention covers a clockwork escapement mechanism of novel construction for operating swinging cradles, couches, hospital cots, etc., whereby power is economized and noise avoided, and heavy bodies may be kept in swinging motion for a long period.

CHURN.—William M. Shira, Butler, Pa. This is a churn adapted to be worked while the operator is either standing or sitting, and is simple and cheap in construction, while designed to make butter quickly, and admit of the ready cleaning of its parts.

COVER FOR BUTTER TUBS.—Henry C. Carter, New York City. This is an expanding and contracting cover composed of independent side sections, with a sliding wedge-shaped section between them secured by slotted attachments, pins or studs controlling the movement of the wedge section and side sections relatively to each other, and dispensing with nails, clasps, and other like fastenings.

TANK HEATER.—Hanford Reynolds, Gifford, Ill. This is a device for heating or warming large quantities of water to prevent freezing, and the heater has a side chamber through which the fire may be raked and the ashes removed without taking the heater from the tank and without extinguishing the fire, the device being especially applicable to tanks for warming water for stock and similar purposes.

SUSPENDED RAILWAY.—John Thomson, Kansas City, Mo. This invention covers an improvement in a class of excavating apparatus, including a series of carriages traveling on an elevated track and a series of buckets suspended from the carriages, to be raised and lowered by suspending ropes or chains, one such rope or chain only being employed by the series of buckets, and all the buckets being raised successively, one at a time, by the rope.

FLUID SEPARATOR.—Thomas J. Newsome, Wilmington, N. C. This device consists of a vessel or tank with a horizontal diaphragm making two chambers, with a central tube, and a discharge pipe connected with the lower chamber, and one connected with the lower portion of the upper chamber, the invention affording a simple means for separating turpentine, oil, or other light fluids from water.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

THE INTERNATIONAL ANNUAL OF ANTHONY'S PHOTOGRAPHIC BULLETIN. Vol. II., 1889. By W. Jerome Harrison, F.G.S., Birmingham, England; A. H. Elliott, Ph.D., F.C.S., New York. E. & H. T. Anthony & Co., publishers, New York. Pp. 479. Price $1.

The second issue of this new annual is fully equal in interest and quality to the initial work published in 1888. It contains eight illustrations by different processes. The frontispiece (a portrait study) is an example of the beautiful gloss and delicacy of detail to be obtained on Aristotype paper, while the two views in the Tyrolese Alps, by Professor D. L. Eimendorf, in the center of the book, are fine specimens of photo grain cuts produced directly from the photographs. An excellent photogravure termed "photophane," representing a portrait of Miss Lillian Seccombe, an actress, also adorns the book. In addition to these attractive illustrations there are many interesting and useful articles on subjects of special value to amateur and professional photographers. "Blue printing," with formulas and illustrations of apparatus for carrying it on, on an extended scale, is very comprehensively treated by C. B. Talbot. There are several articles on the new hydroquinone developer and how to use it, the making of window transparencies and lantern slides, some conveniences for the amateur, orthochromatic photography, photographic emulsions and machinery for making them, the uses and development of gelatino-bromide paper, hints in photo-micrography, and many useful tables and formulæ. It is a mirror of the latest experiences and progress of the science of photography, and should be in the hands of every progressive photographer.

PHOTOGRAPHIC MOSAICS, 1889. Edward L. Wilson, editor and publisher, New York. Pp. 144. Price 75 cents.

Now in its twenty-fifth year, this book, containing a number of useful articles by well known writers, is a valuable acquisition to any library. Over forty pages are devoted to a review of a year's progress of photography. An article on "A Potash Developer," by Charles Ehrmann, and others on "Suggestions for Vignetting," by Karl Klauser, "Suggestions for Beginners," by Wallace Goold Lovison, "Swelled Gelatine Process of Making Photo-Relief Plates," by W. T. Wilkinson, and a valuable table, "Of Space Traversed, of Time Occupied, of Velocity Acquired, by a Falling Body," by J. J. Higgins, A.M., M.D., convey an idea of the practical and scientific nature of the book. It is well printed, and contains five phototype illustrations.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(968) A. H. H. asks: Would an armature constructed same as the one in the 8 light dynamo (SUPPLEMENT, No. 600) work well in the simple motor (SUPPLEMENT, No. 641)? A. Yes.

(969) E. S. asks how to change the voltage of the dynamo described in SUPPLEMENT No. 600, so as to be able to run 70, also 110 volt lamps, instead of 50 volt (which are hard to get). In what SUPPLEMENT will I be able to find how to make storage batteries, how to charge them, and all necessary information in order to make and run them? A. You can change the voltage of the dynamo by increasing the power of the field magnet, or by increasing the speed of the armature within certain limits. You can readily obtain 50 volt lamps from the manufacturers. We shall publish at an early date information on the construction of storage batteries. See SUPPLEMENT, Nos. 322, 323, 610, and many others.

(970) W. H. T. asks: 1. Can the simple electric motor described in SUPPLEMENT, No. 641, be used as a hand dynamo? A. Yes; provided you use a cast iron field magnet and wind the armature with finer wire, say No. 20. 2. If so, is it necessary to use wire of a different size from that given in the article referred to? A. See above answer. 3. Would such a dynamo be as efficient as the one described in SUPPLEMENT, No. 161? A. We think not.

(971) R. S. G. asks for a receipt for glue that will stick two pieces of glass together. I wish something that will resist the action of pyrogallic acid, or, in other words, some glue that I can fasten pieces on inside of a developing tray. Page's glue will hold it only for a day or so. A. Make some thin solution of ordinary glue, weighing it before putting it in the water. Then in a darkened room add one-tenth the weight of the dry glue of bichromate of potash, glue in the dark and expose to light while drying. Add a little glycerine to the glue also.

(972) Quaker City asks (1) how to make a tooth powder that will whiten the teeth instantly. A. We can recommend no such powder, as it would be highly injurious to the teeth. Precipitated calcic carbonate, often called precipitated or dropped chalk, is an approved dentifrice. It may be perfumed with a little orris root, and a little dried castile soap may be rubbed up with it. The teeth should be put into good condition by a dentist and maintained in order by the use of the simple dentifrice recommended. 2. Also how fire eating is done as performed in the museum? A. Soak a piece of thick cotton cord in a solution of nitrate of potash and dry it. When exhibiting, a lot of tow is held in one hand with the piece of cord, which has been lighted, concealed in it. Some tow is taken into the mouth within which the slow match or lighted end is embedded. If now the breath is expelled through the tow it becomes ignited and smokes and glows, which can be extinguished by closing the mouth. The cord, however, continues burning, so that the same effect can be several times produced. As another method raisins can be dipped in alcohol and lighted and then can be dextrously eaten without burning the mouth. The point in this case is to close the mouth quickly.

(973) F. W. F. asks: 1. Will you or any of your readers kindly furnish a description of the mechanism used in organs where electricity is the medium for transmitting motion from the keys to the pallets? What kind of battery is used, and how many, if more than one? I have been unable by personal inquiry to gain any information respecting organs in which electricity is used, for, so far as I can learn, there are no such organs in Canada, at least in Ontario. Are there any serious disadvantages in these organs, and if so, what are they? A. See SCIENTIFIC AMERICAN, vol. 55, page 83, for description of such mechanism and other particulars asked for. It works perfectly in practice and is being more extensively used every year. 2. Is there any chemical that is bleached by a current of electricity passing through it, or one that is given a decided color, the two poles being placed the thickness of paper apart, or wider. If there is such a substance, what is it? A. A solution of iodide of potassium, or a dilute solution of the same with starch, or a solution of ferrocyanide of potassium and nitrate of ammonia can be used to saturate paper. These will produce colored traces under the influence of an electric current.

(974) E. A. D. asks: 1. Is there any chance for a young man in the profession of electrical engineering? A. Not very good without some influence. 2. Where can one take a course? A. Cornell University, Ithaca, N. Y. 3. What length? A. Three or four years.

(975) J. C. G. asks a recipe for a fire kindler that will start an anthracite coal fire. A. We would suggest charcoal dried and soaked in solution of nitrate of potash and again dried. Or one part chloride of lime may be mixed with three or four parts of charcoal dust to a thick paste, with a little glue or other cementing material and formed into lumps.

(976) F. E. P. writes: I wish to inflate a small balloon of about 500 cubic feet capacity. Will you give formula for making gas from sulphuric acid

and iron turnings? A. Place the turnings in a large demijohn and pour acid on them. For five hundred feet you will need 199 pounds of oil of vitriol and about 70 pounds of iron. The evolution flask must be arranged with doubly perforated cork, etc., so that acid can be introduced without interfering with the progress of the work.

(977) G. H. B. asks for the government receipt for mixing whitewash so it won't wash off. A. Slake ½ bushel lime with boiling water, keeping it covered during the process, strain and add 1 peck salt dissolved in warm water and 3 pounds rice flour boiled in water to a thin paste, ½ pound Spanish whiting, and 1 pound clear glue dissolved in warm water. Allow it to stand several days and apply hot.

(978) L. F. asks how to make combustible paper. A. Soak the paper in a saturated solution of nitrate of potash. This makes touch paper. To make paper that will burn and disappear with the explosion, it must be treated with strong nitric and sulphuric acids, and washed thus, converting it into nitrocellulose or gun cotton. The process of making the latter is fully described in the SCIENTIFIC AMERICAN of February 23, 1889.

(979) F. C. G. writes: I have knitted some small shoes out of druggists' cotton cord, in delicate shades and bright colors, for the market. Can you tell me through your valuable paper, or otherwise, how to preserve their delicate coloring? I have been saturating them in hot borax water preparatory to puting on the gum arabic: they fade. There is something that is used with the borax that will preserve the color, but I am unable to tell what that is. A. We would suggest the use of alum, or chloride of tin as a mordant, but we fear that the cotton will still fade.

(980) O. A. B. asks: 1. How cement used for cementing the rubber tires to the felloes of bicycles is made. A. Dissolve 1 part gutta percha in bisulphide of carbon q. s. Mix with 20 parts asphalt or shellac and warm over water bath, until it is melted to a thick paste. 2. How to make liquid cement for cementing rubber. A. Unvulcanized India rubber is masticated by powerful rolling and grinding machinery, until disintegrated, and then is dissolved in coal tar naphtha. After it has been used as a cement, the cemented place may be treated with a solution of chloride of sulphur in bisulphide of carbon. In our SUPPLEMENT, No. 249, an excellent description of India rubber manipulation is given.

(981) J. R. writes: We have an artesian well in our city park on the bluff, 165 or 170 ft. above, but adjacent to the river. What effect, as regards flow of water, would a pipe have, attached direct to mouth of the well, *perfectly air-tight*, and leading down over the hill 80 or 100 ft.? Would flow of water be greater than to let it flow free into reservoir on a level with the mouth of well, or equal to a well bored on a level with discharge of pipe 100 ft. below mouth of well? A. It would be between the two. The "head" independent of friction would be equal to that of the lower level well, but friction would impede the full flow due to such head or pressure.

(982) C. R. R. writes: When shellac is melted over fire not hot enough to burn, it becomes thick and soapy, and will not pour into a mould. What plan could you suggest that we pursue with it, to form it into sticks about 5 in. long and ¾ in. in diameter, and get them solid and without a flaw? Is there any way of melting shellac, without burning, so as to get it thin as water or molasses? We have been "stuck" on this problem for several months. A. You cannot melt shellac as specified; it can, by an admixture of some ingredients, such as Venice turpentine, be made more fluid, but pure shellac is never perfectly liquefied by heat alone. Try rolling it into shape under hot water.

(983) D. W. W. Co.—For a cheap lining for your packages, we know of nothing better than bichromatized glue. Make a glue sizing of suitable consistency and add about 5 per cent of bichromate of potash to render it insoluble in water. Coat your packages with this size and allow them to dry in a light place. After they are dry, expose them to the direct rays of the sun for an hour or so. This coating would not answer for packages for containing articles of food. A small percentage of glycerine added to the size would increase its flexibility. If you desire to add a pigment to give it more color, you can use whiting, chrome yellow, or any of the iron oxide paints.

(984) J. A. McC. asks how to bronze steam pipes, used for steam heating. A. The pipes are painted with ordinary chrome yellow, and when nearly dry gold bronze powder is rubbed upon the surface with a piece of fur. When thoroughly dry, the surface is varnished with a very thin copal or mastic varnish.

(985) P. G. O'G. asks: 1. A reliable formula for a liquid stove polish, odorless as nearly as possible. A. Mix two parts copperas, one of bone black, one of pulverized graphite, with sufficient water to form a creamy paste. 2. In what oil or acid graphite is soluble to greatest extent? A. There is no solvent for plumbago.

(986) J. G.—For fire proofing wood make a solution of 27 parts sulphate of zinc, 11 parts potash, 22 of alum, 11 parts manganic oxide in warm water, to which add 11 parts of sulphuric acid, gradually. Soak the wood for three hours in the warm solution and dry in the air.

(987) B. W. I.—Carry the water line, 4 in. in a 3 ft. boiler, 5 in. in a 4 ft. boiler, 6 in. in a 5 ft. boiler, and 7 in. in a 6 ft. boiler, above the top of the tubes at the front. Back end of boiler should pitch down from 1 to 2 inches.

(988) E. F. C.—Pure water or rain water dissolves iron in boilers faster than waters containing lime or magnesia, the carbonates being the best preservatives. Rain water sometimes contains acids in a very slight degree, derived from smoke and soot upon roofs of buildings or from the smoke of chimneys.

(989) R. L.—Uranus passed its perihelion in 1883. Its next will occur in 1966. Distance from the sun at perihelion about 1,681,864,000 miles. Neptune passed its perihelion in 1884. Its next perihelion will occur in 2048. Distance from the sun at perihelion about 2,755,207,000 miles. The specimen sent is gneiss, containing quartz, hornblende, and pyrites, of no value.

(990) M. L. asks (1) how to erase a stain out of a wall, which was caused by blisters having been sent forth at that spot only, which were filled with dirty water. I have touched it up, but after ten days the blisters were reproduced, then I used shellac, but without any effect. A. From your description it would appear that there is a permanent source of trouble in or back of the wall. If so, the blistering cannot well be prevented except by removing the original trouble. It may be due to lumps of unslaked lime in the mortar used in plastering the wall. These may have to be cut out and the holes replastered. 2. Which is the best oil and how much of it should I use to oil a brownstone front 20 feet wide by 4 stories high, and how many coats should I give it? A. Give two coats of boiled oil. The quantity used will depend entirely on the stone. Try a small portion of it to determine the amount absorbed. 3. How to make gold fluid so that the bronze will not turn green in the bottles? A. Copal varnish is the proper vehicle. It is best not to mix it with the bronze powder until you are ready to apply it.

(991) M. H. S. asks for a preparation which will render paper—ordinary straw—impervious to water, when mixed either with the pulp in its manufacture or coated with it after its manufacture. A. Mix the pulp with glue containing bichromate of potash equal to ten per cent of the weight of dry glue used. Conduct operations as much in the dark or in an obscure place as possible, and afterward expose the paper to the light. This will to some extent effect your purpose. Or dry the paper as thoroughly as possible and dip it in hot paraffin. According to the texture of the paper, these methods of treatment will affect a greater or less depth of its material.

(992) P. N. writes: Will you advise us whether limestone that will produce a fine quality of white lime can be used for making a cement that would be of any commercial value? A. Probably it is not specially adapted to the purpose. By proper admixture with clay or ground slag a species of Portland cement might be made from it. 2. Our boiler is fed from a well 50 feet deep in solid rock. On the boiler being cleaned, if the sediment taken from it is allowed to stand a few minutes exposed to the air, it becomes quite firm and hard. Do you think these rocks would make a cement? A. It is impossible to say. The mere hardening in the air tells nothing in your case. 3. How is hydraulic cement made? A. By burning the proper limestone in kilns, crushing, and grinding.

(993) W. A. B. writes: I have a fruit drier revolving within a chamber, which necessarily becomes very hot and causes the journals to heat, thereby causing much loss of time. Will you please to answer through the columns of your paper, if you know of any lubricant which might be used and which would not evaporate in the chamber, the temperature being about 200°? A. Use heavy cylinder oil, or tallow, arranged to feed in by a gravity sight feed lubricator. Or use best quality of graphite mixed with tallow.

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June 18, 1889,

AND EACH BEARING THAT DATE.

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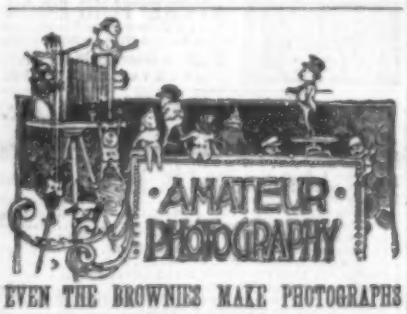

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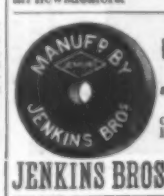

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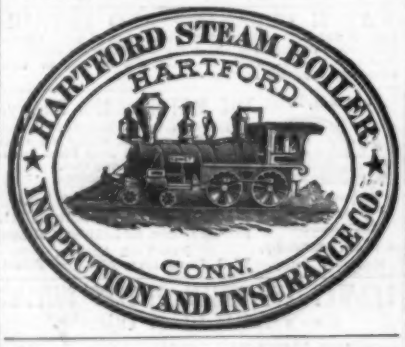

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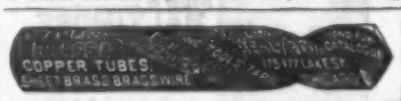

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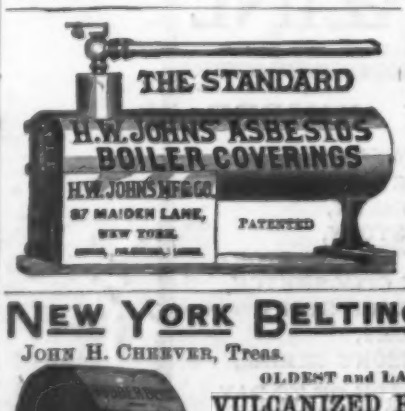

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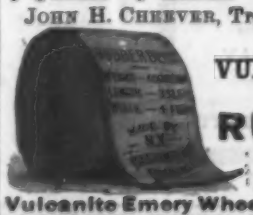

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